

*Dedicated
to
Gujarati Harappan Seafarer*

Harappan Maritime Legacies of GUJARAT

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PREFACE

Trade and commerce has become an integral part of present day society and is responsible for cultural interaction between different parts of the world. In India, Harappan civilization had laid the foundation for maritime tradition around 4500 years ago. Recent excavations in the northern Kachh region have demonstrated that the maritime practices in India probably date back to even earlier to the Harappan civilization. Sir John Marshall has carried out extensive excavation at Mohenjo-daro during 1922 and provided convincing evidences for the maritime activities during Indus civilization. Subsequently, plenty of work has been carried out on the Indus-Mesopotamian trade by various Indian and foreign scholars. Recent works by French Archaeologists in Gulf countries, particularly in Oman and United Arab Emirates, throw enough light on the maritime relations of those regions with Indus Civilization. During the last two decades a number of Harappan sites have been excavated in Gujarat which is considered to be the richest province of Indus empire. Most of the scholars considered Lothal as the centre of overseas trade despite ambiguity over the Dock-Yard. A few more excavations have clearly suggested that Harappan society in Gujarat depended on the maritime trade. The main Harappan ports were Lothal, Dholavira, Kuntasi, Prabhsa Patan (Somnath) and Nageswar. In addition, several other minor ports located close to the sea appear to have played supportive role.

The aspect which received less attention to date is the coastal study and underwater archaeology. The present work is the extended form of my Ph.D. thesis (1999) which includes all aspects of maritime activities from 3000 BC to 1000 BC. The settlement, ports of different phases of civilization and causes of their decline have been dealt with, in the present work. The recent archaeological discoveries from the Harappan sites have also been included in this volume. The sea level fluctuations, palaeoclimate and sedimentation have been used to explain the probable causes or the decline of the Indus Civilization. The entire work is divided into 10 chapters as follows.

All protohistoric coastal sites of Gujarat have been studied to understand their maritime aspect. Now it appears that there is a consensus suggesting that the Harappan civilization had developed to an extent of participating in well-organized trade system. Therefore, this aspect needs a special attention and is worth studying in greater details. Due to the vastness of the subject, it was not possible to include the entire Harappan empire in this work. Therefore, I have concentrated mainly on Gujarat Coast where the Harappan civilization probably had witnessed the longest period of existence for nearly 1300 years.

A.S. Gaur

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SECTION I

1

INTRODUCTION

India has been the land of great cultural heritage, where most of the villages have preserved some rather ancient remains depicting cultural richness. The remains of the earliest man *Ramapithecus* in Siwalik range and the remains of *Homo Erectus* in Narmada valley provide evidence for human evolution. On one hand, the rock art of Upper Paleolithic is preserved in Madhya Pradesh while on the other hand entire subcontinent was occupied by the Mesolithic people. When the great civilizations were emerging on the banks of major rivers of the world, the Indus-Saraswati river system in India supported Bronze Age Civilization which was the greatest among all civilizations. The first scientific creation by human in the history may include wheel and some kind of float in river, lake or even in sea. The invention of float might have opened the door of the sea for future human race. Today more than half of the world population is dependent on resources from the sea and more than 95% national and international trade depends on the sea routes.

Indian Ocean has witnessed the dawn of several Bronze Age Civilizations around it; for example, Egyptian, Mesopotamian and Indus Valley civilizations during 4th - 3rd millennium BC. The evidences for their overseas trade have been recorded by earlier workers. Around the Christian era, Romans were actively involved in overseas trade with India which has been proved by the presence of several sites of Roman period along the Indian coast. Finally, in the 16th century AD many European companies from Portugal, England, Holland, France, Denmark, etc. came to India through sea route via Africa and Madagascar. There are several archival records which suggest that number of ships belonging to different countries sank in the sea and now have become a part of their respective cultural heritage. Apart from shipwrecks many ancient ports have also been submerged in the sea. Exploring the sunken heritage is important for educational and scientific purposes.

Submerged sites and sunken shipwrecks should be treated as our cultural heritage. In this connection it is relevant to mention that the exploitation of marine resources in India dated back to the earliest times. There are fairly good evidences of exploitation of marine resources from Mesolithic period. In Europe, a Mesolithic culture known as the Kitchen Maiden Culture has been found. Plenty of shells have been discovered from these sites.

With the emergence of marine archaeology a significant amount of work has been carried out in Mediterranean waters. The earliest ships dated to be around 1400 BC at Ul Burun (Bass, 1986) and at Cape Gelidonya (Bass, 1967) have been excavated and add another chapter in the history of marine archaeology. The history of trade and commerce is not complete

without a proper understanding of maritime development. In India marine archaeological research started in 1981 by establishing a centre at National Institute of Oceanography, Goa. The studies carried out in this Institute resulted in many exciting results. The discovery of stone anchors from Dwarka and Somnath waters in Gujarat, Vijaydurg and Sindhudurg in Maharashtra and at a few sites in Tamil Nadu coast are few amongst such results. Seven shipwrecks from the coast off Goa, Lakshadweep and Poompuhar were also discovered. Thus, at the outset it appears that India has a large scope for marine archaeological investigations.

Out of the 25 states in the Indian Union, the Gujarat state (Lat. $20^{\circ} 10' N$ to $24^{\circ} 50' N$ and Long. $68^{\circ} 40' E$ to $74^{\circ} 40' E$) has the earliest maritime tradition in India (Pl. 1). It is bound by the Arabian Sea and Maharashtra on the west and south, by Pakistan on the north and west, by Madhya Pradesh on the east and by Rajasthan on the north. It has a coastline of more than 1600 Kms long and every part of the state is within 160 Kms distance from the sea. The area of the state is 1,87,091 square Kms. The Gujarat state consists of three distinct units namely Kachchh, Saurashtra and Gujarat. The Kachchh region is mostly marshy and sandy the land mass of Saurashtra is formed by the Deccan basalt. The coastal area is made up of recent alluvium.

The Gujarat unit has three zones: the coastal belt of south and central Gujarat, the large tract formed by the Sabarmati and Mahi, and the eastern most hilly terrain which appears like a bridge between Malwa Gujarat and Rajasthan.

There has been a general belief that only northern Gujarat region provided a suitable habitat for the settlement of early man. The probable reason could be the easy availability of Quartzite, the

rock preferred by the early man for making tools. Later explorations in Central Gujarat in the valleys of the Orsang and Karjan, the Mahi and Lower Narmada have confirmed the existence of Stone Age man in these areas. Apart from those valleys, Kachchh was also inhabited by the Early man. Though there is some evidence of Middle Palaeolithic settlement in the Gujarat region, the most important settlements were in the Mesolithic period. A Mesolithic site Langhanj was extensively excavated which has thrown light on various phases of Mesolithic settlements. Gujarat has the distinction of hosting large number of Harappan sites, starting from the earliest level of Harappan civilization. The recent excavations at Dholavira in Khadir Bet indicated even Pre-Harappan settlements in Gujarat particularly in Kachchh region.

In all probabilities Gujarat appears to be the first province in India pioneering in the field of overseas trade. The earliest evidence from the Kachchh region suggests that, around 3000 BC, some migration took place from Sind to Kachchh in search of suitable place to develop the maritime activities, which possibly attracted the early Harappans to establish their settlement in Kachchh. Even though, the climate of Kachchh area was much harsher than Sind and Punjab the early Harappan settlement in this region is intriguing. A most reasonable argument could be that, the early Harappans chose southwest Rajasthan and northeast Haryana region for agriculture while Kachchh, for maritime activities. Therefore, it appears that the initially migrated people were of trading community, subsequently the migration turned into a big settlement and played a major role in economy and social structure of Harappan civilization. Gujarat might have perhaps, attracted the early Harappan migrants because of its rich resources like semi precious stones and marine food in addition to a large scope to develop maritime activity.

A detailed discussion of Harappan ports has been presented in this work with special reference to Dock-Yard at Lothal. Old and new hypothesis have been presented including the latest one proposed by Nigam (1988), where a few marine planktonic species characteristic of marine environment were identified in the sediment of Lothal Dock-Yard. However, the scientific reasoning needs to be supported by archaeological evidences and forms part of the discussion in this work. Amongst the excavated sites, Kuntasi has evidence of a jetty belonging to Harappan period. Presently the site is located about 5 Km from the Gulf of Kachchh. Nageswar, which is located about 20 km northeast of Dwarka was the major centre for shell works. The excavation suggested another interesting story about Harappans that they had expertise in deep sea fishing as evident by deep-sea shell recovered during excavation. A recently, excavated Harappan site at Dholavira in Khadir Bet of Kachchh, which is known as the index site of Harappan civilization in Gujarat, has provided clues for their maritime activities. The location of the site at Dholavira and the earliest habitation of Harappan civilization indicate that people from Sind migrated to Gujarat for the maritime trade and exploitation of marine resources. It is widely accepted that around 4000 years BP Rann of Kachchh was more than 10 m deep which could have been used for the navigation purpose and Dholavira was the safest port. It is possible that till 1700 BC Rann was navigable.

The archaeological findings from Lothal and a few other sites clearly suggest that Gujarat had overseas trade contact with contemporary civilizations. The discovery of semiprecious stone beads and Indus seals from Ur, Brak and Nippur, etc., in Mesopotamia and from other Gulf countries like UAE, Oman and Bahrain demonstrate that Harappan traders had overseas communication with the Persian Gulf countries. Recent

excavations of several archaeological sites in above mentioned countries yielded numerous antiquities related to the overseas trade with India during the late 3rd and early 2nd millennium BC. In addition, an Indus seal was discovered by K.M. Srivastava in Bahrain Island along with a large number of carnelian beads. Oman peninsula which is also considered as the land of ancient copper mines supplied to the Sumerian, is suggested as the land of Dilmun instead of Failaka island.

Gujarat is very rich in natural resources such as semiprecious stones and marine products. Among the marine resources, the conch shell is available in Kathiawad and Kachchh coast. Shell objects are widely distributed through out the Harappan sites and outside the Harappan domain as well. The much concentration of Harappan sites in northern Saurashtra coast clearly suggests that they were involved in overseas trade and exploited marine resources. Excavations at a few coastal sites such as Kuntasi, Nageswar and Padri suggest that they had an extensive trade network, shell works and production of salt respectively. A large copper fish-hook belonging to mature Harappan phase from Padri indicates relatively deeper water fishing technology.

Several inscriptional tablets from Ur excavations mention about the import and export items from three different lands known as Dilmun, Magan and Meluhha. Among them Meluhha has been widely accepted as Indus empire. This was further confirmed by the presence of Indus items in Mesopotamian territory. These items include Indus seals, etched carnelian beads and shell objects.

There is also evidence about the relations with east African coast. Discovery of terracotta mummy and Gorilla from Lothal and a recently discovered seal from Rangpur suggest that Indus people must have gone up to the Red Sea.

About the maritime activity during the Rigvedic period, Frawley (1993:64), based on the earliest documentary text, says that "the Vedic culture is maritime, the Vedic people lived by the sea for some time before the hymns of the Rig Veda were composed. They were hardly limited to northwest India and we must place them along the coast".

Another aspect of this study is to understand the causes for the decline of Harappans in Gujarat. Since, majority of scholars consider the Harappans as the seafarers then the study needs to be concentrated on the decline of ports, trade and economy. These issues have been addressed in detail in this work. Though lot of work has been carried out by various scholars right from the discovery of Harappan sites in Pakistan, the reasons assigned for the decline of Harappan civilization by those workers should not be generalized for every site. In all the probabilities, several local natural, economical and social events might have played a decisive role in the decline of different Harappan sites; e.g. Sahni and Raiks have put forward a hypothesis of tectonic activities in Makran coast, Sir John Marshall, invoked the flood theory and Sir M. Wheeler suggested Aryan invasion for the decline of Harappan civilization. However, the Aryan invasion theory has been rejected by several archaeologists and historians. A few other things such as sea level changes, tectonic activities, rapid siltation in Rann of Kachchh, Gulf of Kachchh and Gulf of Cambay has contributed a lot in disuse of the ports particularly in Gujarat. There is evidence of sifting of their habitation from one site to another and they could

not continue after 16th century BC and lost their identity and diffused in local chalcolithic cultures of Deccan.

The overview about Harappan civilization discussed is based on published materials, viz., *Indian Archaeological Reviews*, *Purattatwa*, *Man and Environment*, *South Asian Archaeology*, *Antiquities*, *IJNA*, *Mariner Mirrors*, *Journal of Earth Sciences*, and other periodicals on Oceanography, and books by various other scholars on Harappan civilization including S.R. Rao, G.L. Possehl, J.P. Joshi, R.S. Bisht, B.B. Lal, B.K. Thapar, Ratnagar Sareen, etc.

As a part of the exploratory program we have conducted several boat cruises involving underwater explorations of Dwarka and Somnath. An extensive coastal survey was also undertaken from Lakhpur to Jakhau. Several archaeological sites such as Lothal, Dholavira, Nageswar, Desalpur, Khirasar and few more in Saurashtra coast, were frequently visited during the study period, and an extensive underwater photographic survey was also carried out to generate the data for the present study.

2

TOPOGRAPHY AND CLIMATE

Geographically, Gujarat (Pl. 1) can be divided into three major regions namely Mainland Gujarat, Saurashtra and Kachchh (fig. 1).

Mainland Gujarat

The mainland is bordered on east by rocky highlands having altitude ranging between 300 and 1100 m and is the extension of the Western Ghats. The flat topped Sahyadri hill range running in east-west direction with progressive rise from north to south is located in southern part of Gujarat north of the river Tapi. The valleys are shallow and wide. The hilly terrain with 150 to 500 m between the rivers Narmada and Mahi is known as the Vindhyan range which mainly composed of Archaean metamorphic and granitic rocks. In the Lunavada and Baria regions quartzite hills show northeast-southwest trend with an altitude reaching up to 600 m forming southwestern extremity of the Aravalli mountains.

The western alluvial plains with a gradual seaward slope consist of a thick pile of unconsolidated sediment belonging to Quaternary period deposited by fluvial and aeolian transport. These plains of north and central Gujarat, formed by nearly 500 m alluvial deposits (Mehr, 1995:4) has major rivers.

Saurashtra

The peninsula of Saurashtra forms a rocky tableland with 300 m to 600 m altitude fringed by coastal plains. A major portion of this region is occupied by the Deccan basalts. The central part is made up of an undulating topography with isolated hills traversed by various rivers. The eastern fringe of Saurashtra is a low lying area marking the site of the former sea connection between the Gulf of Kachchh and Khambhat. Today, it is seen as a saline wasteland interspersed with marshes and lakes. To the north, the peninsula is flanked by the Gulf of Kachchh and on its west and south bordered by the Arabian sea.

At some places, the relics of the tablelands of igneous intrusions stand-out either as erosional features such as conical and circular hills rising to a great height. Numerous linear dyke ridges protruding above the basaltic surface reach height upto 10 m above the general level of the ground. An elevated strip of ground connecting the highlands of Rajkot and Girnar forms the major water divide of Saurashtra. The coastal plains fringing the basaltic highlands show a maximum altitude of 50 m and comprise of Tertiary and Quaternary sediments. The alluvial plains of the rivers Shetrunji and Bhadar form the most fertile part of the peninsula.

Kachchh Area

The crescent shaped region known as Kachchh is the north-west part of Gujarat. It is bound on the north and north-west by Sindh (Pakistan), on the north-east by Rajasthan, on the east by the districts of Banaskantha and Mehsana, on the south by the Gulf of Kachchh and the Rajkot district and on the south-west and west by the Arabian Sea. The Kachchh is divided into four geomorphic areas as below.

1. The Rann forms an unique salt-encrusted wasteland rising only a few metres above the sea level. It is divided by the rocky highland into the Great Rann on the north and the Little Rann on the east. The two Rann areas get inundated by one meter water during south west monsoon.
2. The Banni plains lying between the Great Rann and the rocky mainland, rise only a couple of metres above the Rann surface and form a shrubby and grassland area.
3. The hilly regions consist of three units, a) the island belt of four rocky projections of Pachcham, Khadir, Bela and Chorar rising above the Rann. b) the rocky mainland on the south of Banni extending up to the Gulf of Kachchh, and c) Wagad region on the northeast of the mainland forming an isolated rocky landmass.
4. The southern coastal plains border the mainland against the Gulf of Kachchh in the south and the Arabian sea in the west. There are two major creeks in Kachchh area.

Kori Creek: This is one of the biggest creeks having a width of about 10 km in at its entrance between Makra and Salek. The creek is blocked by several sand banks except on the eastern side where channel leads into the creek. There are two ports on this creek i.e. Lakhpat and Koteswar. The port of Lakhpat has lost its importance and the port of Koteswar though presently not considered as a port is held in reverence because of the Koteswar temple.

Godia Creek: The entrance to the Godia creek locally known as port Jakhau (Latitude 23 14' N and Longitude 68 35' E), can be identified by few sand hills to a height of 9 metres. The northern side of its entrance is marked by two wooden beacons about three cables apart. About 3 km within the entrance point on the southern side of the creek, there is an iron wharf. A light is exhibited at an elevation of 14-32 mts from a framework shown on masonry hut 6-7 mts in height situated on the above wharf.

Besides, there are few smaller creeks namely, Boacha, the Malirdi, Mandvi and the Nakti.

The Coastline of Gujarat

The 1600 km long coastline with its various segments provide evidence of the role played by eustasy and coastal processes operating during the Quaternary period. The coastline between Jakhau and Kandla of Kachchh has irregular and dissected configuration. The north western coast of Saurashtra (Jamnagar-Okha) shows a crenulated rocky shoreline with the subtidal zone consisting of channels, shoals submerged islands, sand-bars, coral reefs and mangroves. The coast from Dwarka to Diu has a characteristically straight NW-SE trend marked by well

developed sandy beaches. The coastal segment between Diu and Bhavnagar shows a transition from open sea to gulf environment. The abundance is upto Bhavnagar, beyond which it becomes part of the Gulf of Khambhat. From Gopnath to Ghogha the coastline is rocky with small narrow non-calcareous sandy beaches. The trend of the mainland coast is almost N-S and exhibits much diversity in its different segments. The northern part of the mainland coast (Khambhat-Dahej segments) faces the Gulf and provides a good example of a drowned alluvial coast characterised by steep, cliff river mouths. The major rivers Mahi, Dhadhar and Narmada that flow into the gulf show broad estuarine river mouths, mud banks and mud bars. Southward on crossing the Narmada river, the coastal geomorphology abruptly changes. The coastline is sandy between Hansot and Umbargaon and shows development of inland sandy-ridges parallel to the coast between Hansot and Hajira. The coast is rocky with narrow crescentic beaches separated by seaward projecting headlands beyond Umbergaon.

Drainage Systems

Drainage System of Saurashtra

The drainage of Saurashtra peninsula shows a radial pattern (fig. 2). Of the few major rivers, Bhadar is the longest. It originates in the central highlands east of Jasdan and flows westward for a distance of 260 km. The tributaries Karnal, Utavali, Phophal, Moj and Vinu joins before it becomes tidal and finally merges into the sea at Navibandar. Shetrunji forms another major river, rising in the Dhundhi hills of Gir ranges, flows eastward and meets the Gulf of Khambhat at Saltanpur. The 160 km long river receives waters of Satali, Singavadu and Gagaria. On southern coast of

Saurashtra several smaller streams like Dhanvantri, Raval, Machundari, Singoda, Hiran and Saraswati are encountered among which the last two rise in the Gir Hills. Amongst the east flowing rivers that meet the Gulf of Khambhat are Kalubhar, Sukhabhadar and Bhogao originating in the hills of Chotila and joining Sabarmati near its mouth. The streams flowing into the Gulf of Kachchh which are restricted to the northern part, are comparatively smaller and more or less seasonal. These include Ghee, Sihan, Fuljar, Sasoi, Rangmati, Nagma, Ruparel, Kankavati, Und, Aji, Demai, Machhu, Godadharu, Bambhan, Phulka and Chandrabhag. Of these streams, Machhu and Aji are relatively larger. Machhu originates in the high lands near Anandpur, flows for about 110 km through the town of Morvi and meets the Little Rann. Aji originates near Sardhar flows across Rajkot and empties itself in the Gulf of Kachchh.

Drainage System of Mainland Gujarat

Major rivers are Tapti, Narmada, Mahi and Sabarmati draining the central and southern parts fall into the Gulf of Khambhat. Tapti river, after flowing through Madhya Pradesh and Maharashtra, enters the trappean highlands of Gujarat and runs for about 100 km before meeting the sea west of Surat. The lower Tapti valley is very fertile and covered with black cotton soil. The Kim river rises in the Rajpipla hills.

Narmada originating in the hills of Amarkantak in Madhya Pradesh, 1150 m above the sea level, cut through the hill ranges of Satpura and Vindhya before entering Gujarat. In Gujarat it has a flow of 150 Km and finally debauches into the Gulf of Khambhat near Bharuch.

The river Mahi, the third largest river of Gujarat after Narmada and Tapti, rises from about 600 m above the sea level in the Malwa region of Rajasthan. It flows for about 180 km in Gujarat. The 70 km lower course is characterised by heavily gullied cliff sandbanks and ravines.

The Sabarmati river originates in the southwestern spurs of the Aravalli hills and traverses a distance of 400 km through the district of Sabarkantha, Ahmedabad and Kheda. The plains of central Gujarat lying between Sabarmati and Mahi are drained by a number of tributaries of Sabarmati like Khari, Shedhi, Mejan, Andheri, Meswo and Vatrak.

The rivers to the south of Narmada are comparatively smaller and rise within the boundaries of the state from the eastern trappean highlands.

Drainage System of Kachchh

The Kachchh peninsula is characterised mostly by ephemeral streams which carry water during monsoon only. The following table represents the various rivers of the area with origin, destination and total length of course.

Name of River	Origin Place	Destination	Total length
Bhurud	Nanama hill in Taluka Nakhtrana	Banni Area	47 km
Kali	Matan Madh village in Taluka Lakhpat	Kori Creek	45 km
Godhatad	Barandha village in Taluka Lakhpat	Kori Creek	42 km
Suvi (Suvai)	Badargdh Village of Taluka Rapar	Great Rann of Kachchh	39 km
Dhudud	Jadodar village in Taluka Nakhtrana	Banni Area	37 km
Malan	Dabhunda village in Taluka Rapar	Great Rann of Kachchh	32 km
Khari	Chadwa hill in Taluka Bhuj	Banni area	27 km
Rav	Badargadh village in Taluka Rapar	Great Rann of Kachchh	26 km
Kaila	Varar and Jhura hills	Banni Area	20 km
Niero	Balachod village in Taluka Abdasa	Arabian Sea	55 km
Kankawati	Gangon village in Taluka Nakhtrana	Gulf of Kachchh	51 km

Name of River	Origin Place	Destination	Total length
Kharod	Nanama hills in Taluka Nakhtrana	Gulf of Kachchh	50 km
Khari	Matano Madh village in Taluka Lakhpat	Merges with river Mithi	39 km
Mithi	Vamoti hills in Taluka Abdasa	Gulf of Kachchh	50 km
Sakra	Mamuyara village in Taluka Bhuj	Gulf of Kachchh	48 km
Nagmati	Naranpur village in Taluka Bhuj	Bhensleewali Creek	46 km
Lakadiawali	Badargadh village in Taluka Rapar	Rann of Kachchh	42 km
Bhukhi	Jambudi village in Taluka Bhuj	Gulf of Kachchh	40 km
Sakra	Vadli village of Taluka Bhuj	Nakti Creek	36 km
Sai	Daha village of Taluka Abdasa	Gulf of Kachchh	30 km
Rakhadi	Abdasa Taluka	Arabian Sea	29 km
Bhukhi	Khedoi village in Taluka Anjar	Gulf of Kachchh	24 km

Climate

Gujarat falls in the sub-tropical climatic zone and a large part lies between 35° C and 45° C isotherms. It forms a transition zone between the heavy monsoon area of Konkan in the south and the arid areas of Rajasthan in the north. The various seasons are a) Monsoon (June to October), b) Winter (November to February) c) Summer (March to June). From March onwards the temperature starts rising reaching up to 45° C in some parts of the State. January is the coldest month with maximum temperature never exceeding 30° C and the minimum temperature falling down to 8° C with an occasional severe cold temperature dropping to as low as 4° C.

Gujarat receives much of its rainfall from the southwest monsoons, with a maximum intensity being during the months of July and August. The southernmost portion receives annual rainfall as high as 2000 mm. The rainfall gradually decreases northward and in the extreme northwest is as low as 300 mm.

Though in the coastal areas the humidity is moderately high but in general the relative humidity is low. Winds are generally light to moderate, increasing in intensity during the late summer and monsoon season. Coastal areas experience stronger winds. The winds blow from west to southwest during the monsoon and northeast to northwest from October to April.

Flora and Fauna

The vegetation of Gujarat varies greatly due to variations in rainfall, altitude, soil, etc. The important timber and fuelwood, characteristic indigenous species of the State are *Tetona grandis*

(teak), *Dal-bergia latifolia* (sisam), *Adina cordifolia* (hed), *Mitragyna parvi-folia* (kalam), *Ptero carpus marsupium* (biyo), *Acacia catechu* (khair), *Gmelina arborea* (sewn), *Grewia tiliaefolia* (dhaman), *Ouge-nia oojeinensis* (tiwas), *Garuga pinnata* (kakad), *Lannea comandelia* (modal), and *Aracia nilotica* (deshi-bawal). The exotic species include *Eucalyptus tereticornis* (nilgiri), *Juliflora* (gandobawal), *Magni-fera indica* (ambo), *Zizyphus mauritiana* (bordi), *Feronia limonia* (kothu), *Mimusops hexandra* (rayan), *Annona squamosa* (sitafal), *Phyllanthus embico* (amalo), and *Syzygium cumini* (jambudo) are the main fruit trees. The important medicinal plants include *Withania somnifera* (ashwagandha), *Aristolochia bracteata* (kidAmri), *Cassia auticulata* (awal), *Datura innoxia* (kalodatturo), *Daemia extensa* (utarni), *Evolvulus alsinoides* (kalishankhaval), *Terminalia chebula* (harde), *Terminalia belliricia* (beheda), *Holarrhena antidysenterica* (kudi), *Helicteres isora* (mararsinghi) etc. Among the oil seed, important species are *Madhuka indica* (mahuda), *Derris indica* (karanj), *Azadirachta indica* (limdo), and *Salvadora oleoides* (pilu). The gum yielding species are *Sterculina urens* (kandaya) *Boswellia serrata* (gugal) *Commiphora mukul* (gugali) and *Aracia nilotica* (bawal) etc. The leaves which are used as beedi wrappers are obtained from *Diospyros mealnaxylon* (timru) and *Bauhinia racemosa* (ashitra).

Domestic animals are cow, buffalo, horse, camel, sheep, goat and donkey. The important wild animals of the cat family found in Gujarat are *Panthera leo*, *persica* (Asiatic lion), *Panthera tigris* (Tiger), *Panthera Parodus* (Panther), etc. The Indian wild ass, a distinctive animal is found in its natural habitat in the Little Rann of Kachchh. Important reptiles found in Gujarat are marsh crocodile, python, variety of snakes, monitor-lizard, chameleon garden lizard etc. Important birds of Gujarat include peacock, flamingo and the

Great Indian Bustard. The common birds are crow, sparrow, parakeet fly catcher babbler, bulbul, magpie, robin, drongo, oriole, myna weaver-bird, swallow, wood-pecker, cuckoo, kingfisher, swift owl, vulture, dove, sandgrove, partridge saras-crane, egret, duck, etc. The long coastline offers food and home to countless shore birds like golden plover stints sandpipes, curlews, rosy pelicans, terns gulf and many varieties of ducks including the Brahmin duck.

The Holocene: Era of Civilization

Holocene deposits of Kachchh belong to two categories 1) sediments of Rann and 2) coastal mud-flats and sandy beaches. The two Rann represent filled up gulf and mark the site of accumulation in an estuarine delta environment that was formed due to fluctuating strandline since the advent of Holocene. During the last 10,000 years the area came under the influence of glacio-eustasy and seismicity related tectonism. These two factors are influencing the strandlines and sedimentation. During the present southwest monsoon, the western and central portions of the Great Rann and part of Little Rann at the head of the Gulf of Kachchh are flooded not only surface from the surrounding highland but also by waters driven-up the creeks from the Arabian Sea by storm tides. The tidal waters carry with them a lot of sediments brought from the Indus delta region. The coarser sediments are deposited in the inlet channels at their heads while the finer sediments are carried further and spread over the flooded areas and get deposited as mud-flats.

Sharma (1990) has described raised mud-flats and raised beaches deposited during the high Holocene strandline and the present day coastal deposits. On the basis of heavy

mineral studies he has established affinity of the coastal terrigenous material with the Indus river sediments.

Fertile alluvial soil, vicinity to the sea, moderate climate, reasonable good rains, wide spread drainage, rich flora and fauna and ample opportunity to establish settlements in this region appear to have attracted the early Harappans to evolve their civilization.

CULTURAL HORIZION

Gujarat has the distinction of holding the longest cultural continuity right from Lower Palaeolithic to modern period. Gujarat, with its varied physiography, had provided natural environment and resources to the early settlers and sustained evolution of human civilization. The land rich in semi-precious stones led the early Harappan settlers to take long mercantile voyages up to Mesopotamia.

Stone Age Settlements

The remains of the earliest human settlements come from all over the Gujarat region. A large number of Lower Palaeolithic tools have been recovered from the Hiran valley (Marathe, 1981) Sabarmati valley (Sankalia, 1974), Mahi valley (Subbarao, 1952), Orsang Valley (Sankalia, 1974) and Karjan valley (Sankalia, 1946). Most of the tools of these areas comprise of core with pebble surfaces having one or two large flakes believed to be removed by using stone hammer as well as the cylinder hammer techniques.

Lower Palaeolithic sites were found at Goki and Sabalpur in Modasa taluka and at Chekhala and Tajpur in Prantij taluka (IAR, 1973-74). The lower Palaeolithic sites were discovered on the banks of Dokamardo nullah about 2.4 km from Halvad on Halvad-Dhranj-Dhara Road, at Rojdi in District Rajkot (IAR, 1963-64 :10-12).

Middle Palaeolithic tools made of chert, agate, jasper and quartzite were located on the rivers Bhukhi, Bhadar, Sang, Miti, and Pat in northern and southern Kachchh area. The tools include flakes, blades, scrapers, points and cores (Ansari and Pappu, 1970). Soundara Rajan (IAR, 1963-64:10) had explored a number of middle palaeolithic sites on the banks of different streams in northern and southern Kachchh. The streams have exposed two gravel terraces. The lower was fairly well hardened and had a doleritic content while the upper terrace consisted of a loose spread of quartzite flakes and fragments. The upper terrace which contains loose gravel and silt is indeed the horizon of the middle stone age tools as several tool-types like flakes, blades, scrapers, cores, points, etc. were noticed. It is noteworthy that the dominant raw material for most of the tools was quartzite with occasional chert, agate and jasper. A few Middle Palaeolithic sites were also found at Vijay Nagar and Ganchhali respectively in Abhapur and Khedbruhma talukas in Sabar kantha district (IAR, 1973-74). Blades and burins have been collected from central Gujarat near Pavagarh hill running south towards the Orsang valley.

A large area of Gujarat was occupied by the Mesolithic people and about 400 sites of this culture have been reported from different parts of the state. The people who used these tiny tools in the form of blades, lunates, triangles, and scrapers meant to be

hafted to bone or wooden shafts and points as composite implements were hunters and gatherers who appeared on the scene prior to the domestication of plants and animals (Sonawane, 1998). The evidences from the sites of Loteshwar (Bhan, 1994), Ratanpura, Kanewal and to some extent from Tarsang (Sonawane, 1996) suggest that some of these people managed herds of sheep and goat and probably cattle which complemented and added to the food resources they obtained by hunting and gathering. The well known site at Langhanaj had produced as many as 13 human skeletons of Mesolithic period. Apart from this there are number of Mesolithic sites yielding non-geometric microlithic industry consisting of blades scrapers, points, fluted cores and arrow-heads at Anguria, Barala, Ratan Tekri and Thesaria of Banas Kantha district and at Fateha Vadi, Kamod, Naj, Odd, Paladi Karjan, Vanzar and Visalpur of Ahmedabad district (IAR, 1973-74:12).

Proto-Historic Settlements

After stone age a well developed culture came into existence beneath the Harappan settlement and was termed as Pre-Harappan in the Indian subcontinent. The excavations at Mehargarh (Jerrige & Lechevallier, 1979; Jerrige & Meadow, 1980) in Northern Baluchistan considered as a nucleus zone of Protohistoric culture. Mehargarh takes the antiquity of habitational deposits in this region back to the seventh millennium BC. These dates take the site closer to many pre-pottery Neolithic sites in Western Asia (Asthana, 1985:47). The site covers an area of more than 200 hectares. The earliest habitation belonging to Pre-pottery Neolithic phase had occupied the northern and eastern parts of the site.

Pre-Harappan

Pre-Harappans in India are quite similar to those of Sindh province of Pakistan. Pre-Harappan settlement of Rajasthan and Haryana is also known as Sothi culture as this culture for the first time was found at Sothi in Rajasthan. A few well known Harappan sites like Kalibangan, Banawali, Lothal, Mitathal, Siswal, Dholavira and Balu, etc., were excavated and traces of pre-Harappan settlements were recorded.

Pre-Harappan settlement in India dates back to 3000 BC and continued up to 2500 BC. The settlement was fortified from the beginning by a wall of mud-bricks. The houses were built of mud-bricks. The use of burnt brick was evident only in a drain. The remains of agriculture like ploughed fields with intact furrow-marks has been noticed about a hundred metres to the south of the settlement at Kalibangan (Lal, 1979:69). Besides agriculture, cattle breeding and hunting were practiced by the pre-Harappans. The meat, fish and fowl were the important items of their diet. Pottery of pre-Harappan period divided into six categories A, B, C, D, E and F (Thapar, 1975:21). The most commonly used pottery was fabric A and is marked by its unusual features which differentiate it from other type of pottery. The pottery belonging to A fabric turned on wheel showing unskilled handling and weak, irregular striation marks. Two colours have been used for painting the pots, a basic black often called Sothi. Fabric B was distinguished primarily by its paste, texture and surface treatment. This pottery was carefully turned on wheel and was treated with red slip up to the shoulder, which was decorated with black colour painting. Fabric C was characterised by a fine texture, smooth and slipped surface in various shades of red. The painted motifs included horizontal bands, loops, criss-cross, borders of plants, fish-scale, metopes,

pendant, triangles etc. The shapes comprised globular and ovoid vases with disc bases, lids, straight sided bowls, dishes. Fabric D was characterised by a thick sturdy and a red slipped surface. The common shapes were heavy jars, troughs and basins. The interior of the basins was decorated on the sides with sharp ridge incisions of varying patterns and with single or multiple rows of cord impressions on outer sides. Fabrics E and F were differentiated on the basis of colours the former being reddish buff and the latter being grey. Fabric E includes vases with ellipsoid body, jars with or without flanged rims basins, knobbed lids, cups-on-stand and dish-on-stand. The painted motifs are executed in both black and white and comprised floral and faunal designs, linear and curvilinear motifs. Fabric F includes dish-on-stand, globular vases, bowls and basins. Some simple linear motifs and curvilinear motifs were drawn in black with occasional use of white grey surface. Apart from above decoration some graffiti marks have been noticed on the pre-Harappan or Sothi pottery (Lal, 1979:75).

The Pre-Harappans (or Early Harappans) had its regional variation according to climate and resources available in respective regions. Recent excavations carried out at Loteswar (Bhan, 1994) in north Gujarat, Padri (Shinde, 1992) in Saurashtra and Dholavira (Bisht, 1997) in Kachchh have suggested that prior to the incoming of the Harappans, Gujarat was already inhabited by the regional non-Harappan Chalcolithic communities. Most of the Pre-Harappan sites are located below Harappan settlement and also there was a cultural continuity with some common features continuing with new elements during Harappan period.

It is interesting to note that, early Harappans of Kachchh exhibit an affinity with Amrian of Pakistan particularly in respect of pottery and other material. The influence of Amrian in Early

Harappan period in Gujarat probably demonstrates the trade relation with the western Early Harappans. Probably the trade relation from Makran coast to Kachchh might have routed through sea route as the distance between these two entities is shorter by sea compared to land route. It is further suggested that Harappans found Gujarat as the most potential region for carrying out commercial trade as plenty of resources were available in this region.

The convincing evidences of Pre-Harappan settlement in Gujarat were obtained from Lothal, where a different type of pottery known as Micaceous Red Ware was discovered. The excavation suggested that, prior to Harappans arrival to Lothal, there was already a group of local habitants occupying the site (Rao, 1973). Excavations at Prabhasa Patan also provided the evidence of Pre-Harappan settlement dated between 3000 BC and 2800 BC (Dhavalikar and Possehl, 1992), which was also called as Pre-Prabhasa culture. The Pre-Prabhasa culture is characterised by four ceramic wares:

1. Hand made red ware with a smooth surface having coarse fabric. The wide mouth jar is prominent in shape.
2. Incised red ware with crude and coarse fabric and not treated with any slip. The surface colour varied from drab-red to grey. The basin is the most prominent shape.
3. A few sherds of black and red colour are believed to represent wide mouth jar and a small carinated handi with red exterior and black interior.
4. Hand moulded crude, grey coloured wares with common shapes of wide mouth jars and dishes.

The excavator has also found the evidence of flood during this period. So there is an hiatus between the Pre-Prabhasa and Early Prabhasa levels.

At Nagwada the evidence for these early settlers comes in the form of a burial actually a cenotaph, that contains ceramics which are distinctly like those from the first period at Amri in the lower Indus Valley of Sind (Casal, 1964). They are fine fabric, pink to red wares with the high featureless rims which is the characteristic of this period (Hegde, 1989). The pre-Harappans were vigorous travelling moving from place to place along with their herds of cattle exploring new areas for settlement and resources until 2500 BC. By 2550 BC, the concept of fortified city formation appear to have come into existence (Dhavalikar and Possehl, 1992). The excavations also reveal that, the pre-Harappans probably had an adequate knowledge of various regions of Sindh and Gujarat as evident by similarity in tools and pottery relicts obtained in both these provinces.

Dholavira, another potential site for Pre-Harappan settlement with about 60 to 70 cm deposit, belongs to this period. The Pre-Harappan people had a well fortified habitation. A large quantity of ceramics similar to that found at Amri was unearthed at Dholavira. The brick size of this period is similar to that of Harappan period, therefore, it is suggested that the first habitation itself at Dholavira had an association with Harappan but other features of Harappans are absent. Minor antiquities are rare in Period I but Bisht (1991) the excavator, notes that copper tools and other implements were found in good strength. A recent Chalcolithic excavated site at Datrana has resulted with a flourished blade industry. These blades are quite similar to those found in Harappan sites. But this industry came through Mesolithic

culture as it is evident from the continuity of culture from Mesolithic to Chalcolithic. This site has been dated back to 5000 years BP (Times of India, April 2, 1994). This may be consider as the pre Harappan settlement with regional variation. A few important sites with their dates are mentioned below.

Chart no.1 Early Indus-Saraswati phase (3000 BC to 2500 BC)

Sites	Sample no.	Calibrated dates	Sources
Rojdi A	PRL 1091, 1085, 1087	2867- 2503 BC	Possehl (1992)
Prabhasa	PRL-90, TF-1287	2911- 2892 BC	Dhavalikar (1992)
Surkotada	PRL-85,	2865- 2668 BC	Gupta (1993)
Babar Kot	PRL-1492	2576- 2510 BC	Possehl (1992)

Sites of the above phase without Carbon dates

Dholavira	Stage I	3000- 2800 BC	(Bisht R.S.) Personal comm.
Nagwada	Period I	3000- 2600 BC	Dhavalikar (1992)

Harappan Settlements

The article by Sir John Marshall in the Illustrated London News (September, 20 1924) stating that a civilization as old as the Mesopotamian had flourished in the Indus Valley, gave an impetus to the Indian Archaeological explorations. Marshall's article was the result of the preliminary excavations by Daya Ram Sahni

at Harappa in 1921. At both the sites large brick buildings, several antiquities including seals inscribed with a pictorial writing were found.

About the Indus Civilization John Marshall stated, "the civilization hitherto revealed at these two places is not an incipient civilization, but the one already age-old and evolved on Indian soil, with many millennia of human endeavour behind it". After the partition of India in 1947, most of the Harappan sites have gone into Pakistan territory. Later, the Indian archaeologists discovered more than seven hundred Harappan sites in Punjab, Harayana, Rajasthan and Gujarat. The first Harappan site after independence was excavated at Rangpur by S.R. Rao and established the sequence of Harappan culture in India. Later, large scale excavations were undertaken at Lothal, Kalibangan, Ropar, Banavali, Dholavira, Kuntasi, Manda, Bhagwanpura, Alamgirpur, Dadheri, Rojdi, Nageswar, Nagwada and Padri.

Harappan culture was not only limited to Indus Valley but also flourished on the banks of Saraswati and its minor branches. In fact, maximum sites of this civilization are situated on the bank of lost Saraswati, a sacred river of Rigveda. Recent satellite images have confirmed the existence of palaeo-channel belonging to river Saraswati. Right from the origin of Saraswati in the foot hills of Himalaya and its path up to the Rann of Kachchh where it joined the sea, a number of sites have been identified on its bank and its tributaries. Therefore, some archaeologists have been insisting to term for this civilization as Saraswati-Indus civilization instead of Indus civilization (Gupta, 1993). The major Harappan sites like Rakhigarhi, Banavali, and Kalibangan are situated on the banks of the dry bed of river Saraswati.

Harappan civilization is characterised by its fabulous town planning and fortification. Mud bricks had been used for ordinary houses and other public buildings, but drains and important buildings were constructed using burnt bricks. Almost all cities were having Citadel and Lower Town except Dholavira where the city was divided into three division namely, Citadel, Middle Town and Lower Town (Bisht, 1989). The cities were fortified with the thick wall and bastions were provided in all the corners of fort. The Citadel and Lower Town had their own fortification. The thickest fort wall was noticed at Dholavira which is about 17 m at Citadel and 13 m at town (Bisht, 1991). The construction of trapezoidal shape of structure at the Lothal is most interesting and was identified as Dock-Yard (Rao, 1979). This kind of structure shows the highest engineering development. The structure is connected with an outlet channel. Though the inlet channel for entering ships during high tide was not noticed, the excavator expects such a channel to exist. The pottery used by the Harappans was well fired and made of well lavigated clay. The main shapes are dish, dish-on-stand, perforated jar, goblet, storage jars and different types of basins and bowls. The Harappans used the seals and sealings for commercial purposes and had undertaken long voyages to western civilizations. They also had a well developed writing system, but script is limited only on seals, sealings of stone clay, metal, and on potsherds except the one from Dholavira where script letters were made out of a paste of minerals. The main constituent of paste was gypsum. Each letter was separated and fixed on a wooden plank. This has been identified as signboard, which may be the earliest evidence of this kind. Probably it was hanging on the facet of north gate of Citadel. There are several other characteristics of Harappan civilization which are being dealt in later chapters.

Possehl and Raval (1989) have suggested that in Gujarat region there are two different but contemporary Urban Phases namely Sindhi Harappan and Sorath Harappan. Further they suggested that Rojdi and other sites in Saurashtra represent a regional expression of the Harappan Urban phase and propose to call this regional Urban phase culture the Sorath Harappan. There are plenty of sites identified in Saurashtra region having Sorath Harappan influence.

Harappan sites were found at Babra and Patdi near Anandpur Chotila in district Rajkot (IAR, 1965-66:12). A number of sites belonging to the Harappan culture were also discovered at Changda, Khanpur, Vadgam Kanewal and Valotur in Cambay taluka and Nar in Petalad taluka. Among these sites Vadgam Kanewal is the largest settlement measuring 300 m X 100 m with a cultural deposit of 2.5 m thick. Pottery collected from this site includes plain and painted Red Ware, Buff ware, crude incised black ware and red ware. The types are dish-on-stand, coarse and carinated plain and painted bowls, pedestal bowls, goblets, basins, lotas and high necked vases of different sizes. The pottery has strong affinities with materials from Lothal A and B and Rangpur IIA, IIB and IIC periods. Besides, pottery, terracotta, triangular cakes and sling balls were also collected (IAR, 1974-75:13). A few important sites with dates are mentioned below.

Chart no. 2 **Mature Indus-Saraswati Period (2500-1900 BC)**

Sites	Sample no.	Calibrated Dates	Sources
Lothal	TF-136,22,27 26,29,133	2461 -2142 BC	Rao (1985)
Rojdi	PRL-1083,1088 TF-200, 199	2452 -1947 BC	Possehl (1992)
Babar Kot	WIS-2232,2235 2234, BETA-43245 43246	2457 -2037 BC	-do-
Kuntasi	PRL-1370,1371	2135 -2034 BC	-do-
Prabhas	PRL-92 TF-1286	2299 -1953 BC	-do-
Surkotada	TF-1305	2555 -2285 BC	Gupta (1996)

Sites of this phase without Carbon dates

Desalpur	Period I	2000 BC	(IAR-1963-64)
Khirasara		2400 -2000 BC	(Rao, 1991)
Nageswar	Period I	2200 -2000 BC	Hegde (1990)
Padri	Period I	2200 -1900 BC	Shinde (1992a)

Late Harappan

The excavations at Rangpur, Lothal, Surkotada and Dholavira have conclusively proved that the Indus Civilization did not perish altogether but survived in a decadent form in Gujarat. The explorations and excavations in Punjab, Haryana and Western U.P. have thrown light on the mature as well as declining phases of the Indus Civilization. Around 1900 BC, most of the mature Harappan settlements were wiped out forcing the inhabitants to seek new lands for settlement. It appears that the distressed mature Harappans have left in small groups, seeking shelter initially on the eastern flank of the Satluj and Ghaggar and gradually moved towards the river Yamuna. The refugees from Mohenjo-daro and southern sites in Sind moved to Saurashtra and later occupied the upper and lower part of the peninsula. Rao (1991:27) believe that the Harappan sites in Rajkot, Jamnagar, Bhavnagar, Kheda and Mehsana districts of Gujarat are undoubtedly Late Harappan sites and do not provide any impressive structural remains worth appelling to Harappans.

The hundreds of late Harappan sites have already been noticed in Gujarat. Some late Harappan sites are camp sites and the occupation deposit in several of them is only 1 to 2 m thick (Rao, 1991). Large villages and market towns such as Prabhasa Patan (Somnath), Rojdi, Adkot, Devalivo, Babarkot, Gop, Rangpur and several other sites in Kachchh region were mainly depended on agriculture and cattle and sheep-rearing. The evidences from a few late Harappan sites of Gujarat indicate that they had commercial activities on the coastal areas. This is confirmed by the presence of maximum sites on the coastal belt of Kachchh, Saurashtra and mainland Gujarat. These sites are either situated on the creek or on the tidal rivers. There were a few sites

on coastal areas where people were engaged in producing salt and shell objects. The late Harappan people moved towards the south and eastward but a few late Harappan sites were also noticed in western Saurashtra.

Among the major ports during this period were Prabhasa, Lakhpatt and probably Bet Dwarka and several others in western Kachchh as well as northern Saurashtra coast. The evidence from smaller sites such as Amra Lakhawal and Nageswar indicate that they were specialised in shell-fishing and manufacture of shell bangles, beads and vessels for domestic consumption and export. The sites in interior where jasper, agate and chalcedony are available; were occupied by lapidaries and blade makers (Rao, 1991). The ceramic constituents of this period show the decline in standard of manufacturing. A few important sites with dates are mentioned below.

Chart no. 3 Late Indus-Saraswati Phase (1900 BC to 1500 BC)

Sites	Sample no.	Calibrated dates	Sources
Rojdi	PRL-1281,1282	1883- 1772	Possehl (1992)
Prabhasa	TF-1284	1859- 1769	-do-
Bet Dwarka	TL date, PRL	1520	Rao (1990)
Malvan		1400	Allchin, Joshi (1995)

Post Harappan Settlements

Rangpur IIC is the transition period from Late Harappan to Post Harappan (Rao, 1962-63). There was a distinct change in ceramic forms from convex-sided bowl of RGP IIA into concavo-convex bowl with a blunt carinated shoulder through this transition.

The small-necked jar was replaced by a high neck jar with oval body and a round bottom. The thick rectangular rim of a jar became beaded and the size of vessels reduced. A new technique of surface treatment, namely wet-smoothing to produce a shining red colour was adopted. Though the ceramic ware was treated, the fabric was not fine. The Late-Harappan pottery, dish-on-stand was replaced by a bowl-on-stand pottery of post-Harappan. Some of the typical Harappan objects such as terracotta triangular cakes, bangles, S-shaped vessel, beaker, goblet and perforated jars disappeared during the transition from Late-Harappan into post-Harappan.

The Lustrous Red Ware, prominent amongst the RGP-III wares was considered to indicate post Harappan period (Rao, 1962-63). The associated pottery of this period was entirely different from the Harappan and late Harappan ceramics. However in few places the pottery style was in continuation with late Harappan, particularly at Prabhasa and Bet Dwarka (Rao, 1987). The pottery was painted with faunal motifs in deep black over a deep red surface. Particular mention may be made of the humped bull with X-shaped horns and deer with back-sweeping wavy horns. It seems that the user of this ware were different from the late Harappan people. Moreover, this ware is recorded only in Saurashtra or Kathiawad. This ware belongs to a village settlement as there were not much developed houses and other public buildings as noticed in earlier period.

The excavation at Dwarka (1979-80), in forecourt of Dwarkadhish Temple brought to light a protohistoric settlement in layer 10 and 11. This two metre thick sandy deposit, was formed when a storm had hit Dwarka and brought the debris from a protohistoric site which was already destroyed (IAR, 1979-80).

Another important site of post Harappan is Bet Dwarka located about 30 km north of Dwarka. An Indus seal carved with 3-headed animal in Bahrainian style, ceramic wares (such as the Lustrous Red Ware, black-and-red ware), and the votive jar inscribed in late Harappan script suggest that the ancient remains of Bet Dwarka dates back to 15th century BC. A stone mould of coppersmith, shell bangles, etc. are other antiquities collected from the site. Blunt and deep carinated bowls in Lustrous Red Ware, beaker and convex bowls in Late Harappan Red Ware, small convex bowl in Prabhas ware, the black-and-red ware jars and troughs and dishes in sturdy red ware are the main types of pottery recovered from this site (Rao, 1991:153).

Bedi Bandar, Vasai, Amra, Lakhbawal, Phala, Kota and Narmana, which are situated within a radius of 20 km of Jamnagar, were shell working centres of Late Harappan times which continued in post-Harappan period also. They are small settlements not more than 200 sq. metres in area. Among the Harappan pottery types, except goblet and beaker, all other evolved types occur at these sites.

HARAPPAN PORTS

There is lot of information on foreign trade and commercial activities in Mesopotamian tablets. There are special mentions of Dilmun, Magan and Meluhha which are considered as separate countries beyond Mesopotamia boundary. Dilmun is identified with the island of Failaka and Bahrain; Magan with South East Iran and Makran coast and Baluchistan; and Meluhha with Indus-Saraswati region. Thus, the Harappan Civilization was known to other major civilizations as Meluhha according to Mesopotamian records. In those records the reference has been made about the presence of Meluhha ships in the Mesopotamian ports. The records refer to imports like timber (the prized sisoo), copper, gold, silver, carnelian, lapis, ivory and pearls from Meluhha. Archaeological findings like carnelian beads, bone inlay, rice, nude male statuary, stone weights, stamp seals with Harappan characters in Sumerian sites suggest trade contact between Sumeria and Harappan civilizations. However, there have been no archaeological evidences for foreign trading in the Harappan sites proper. This one way traffic is yet to be explained

satisfactorily. As early as in 1925, L.A. Waddell had opined that the trade contact between Indus Civilization and Mesopotamia was in existence. In this opinion, the place name inscribed on most of the Sumerian seals, preserves the original name of the ancient seaport and city state of the Lower Indus, the name of which survived there down to the seventh century of Christian era. He also presumed that once upon a time Mohenjo-daro was on the sea coast. Later on several sites have been discovered in lower Indus such as Chanhudaro, Amri, Nuhato and Gharao Bhro of Harappan period which refutes the location of Mohenjo-daro near the sea coast. (Mughal, 1990:162). Mohenjo-daro was considered to be an ideal riverine port. Mackay (1976:118) observed that, the small flat sherds are the fragments of pottery boxes with ornamentation similar to those of the earliest wares recovered from Egypt, Sumer and Elam civilizations. This observation has an implication on the probable trade contacts between Indus Valley and Western civilizations. If the Indus valley had established contacts with contemporary west, then Gujarat Harappans also may have similar communications with rest of the civilizations.

Indus civilization had occupied the longest coastline of Indian continent as compared to other contemporary civilizations. It is suggested that a major community of Indus civilization probably was belonging to traders and hence was responsible for the elevation of that civilization to a highest point of the contemporary civilizations. Their internal trade network was well organised in such a way that most of the regional products were distributed. For example, lot of marine shells have been recovered from hinterland areas of the civilization, where there was no possibility of sea existing during that period in those areas.

Harappan Ports in Makran Coast

The Makran coast indented with bays like Sonmiani bay, Hinglaj, Ormara, Astola island, Pasni, Gwadar and Tiz which offers many sheltered anchorages for boats. The river navigation probably was generally practiced by Harappans of this coast as much of the river carries sufficient water till its confluence during rainy seasons.

Sotkagen-dor (Stein, 1931:61) is the most westerly situated Harappan site with a fortified citadel and adjacent residential area, and provided typical Harappan pottery. Micaceous ware occurs in the earliest level of the civilization while are missing here. Dales believes that this and the Harappan ware could have been actual imports from Sind. It is interesting to note that a few sherds of micaceous and Harappan ware have recently been found at a third millennium site Ra's al-Hadd in Oman (Cleuziou, 1992:96).

Balakot is another Harappan site on an old course of Windar river and located 9 km inland. The site has been identified as a seaport by R.L. Raikes. Presently the area is under intense irrigation (Dales, 1974:3-22). The lowest level here belong to pre-Harappan period having ceramic links with the Nal culture. The Harappans probably occupied this site after abandoning it for some time.

On the Makran coast, Harappan sites are not situated on the present day sea-shore, but are located at substantial distances inland. Sotkagen-dor is at a distance of 48 km, Sotkakh 12 km and Balakot 9 km. But geological studies have indicated that during those days of civilization Sotkagen-dor was

much closer to the sea. Mockler (1877:126) quotes a then local tradition that the sea once lay close to Sotkagen-dor which had a bundur and a fleet of boats. Five distinct levels of raised gravel platforms, and the abrupt rise of the coastal plain from the sea bed between Pasni and Jiواني has been recorded (Ullah, 1954). Snead (1967, 550-7) has reported oyster shells and unweathered barnacles in the southern Haro hills, which is about 9 to 12 m above the present sea level.

Now, it is firmly believed that tectonic uplift, sea level recession and river sedimentation have all together contributed to very rapid and extensive morphological changes on this coast in recent times.

Harappan Ports in Gujarat

Gujarat was the southern most province of the Indus Empire which was occupying the largest area compared to those contemporary civilizations. The civilization covered approximately 1.5 million square kms of area, and was spread to north up to Manda in Jammu, to south up to Daimabad in Maharashtra, in west up to Sotkagen-dor and in the east up to Alamgirpur in U.P. The uniqueness of this civilization was the basic uniformity in each aspect of human life with a very few regional variations.

The Harappans who settled on the coast of Makran, Kachchh and Saurashtra successfully explored the hidden treasure of the sea while fishing in dangerous waters. Thus shell fishing became an important source of revenue as it supplied the raw material needed for making ornaments, tools and game pieces. The highly resourceful craftsmen of Harappan cities could even

produce scientific instruments in shell of which compass and linear scale are good examples (Rao, 1985:616). Many of the luxury articles like gemstones and ivory were exported to Bahrain and Ur, Kish and Brak in Mesopotamia besides Susa in Elam. The Harappan settlements noticed in Mesopotamia suggest that the Harappan merchants were not satisfied with acting as agents for trading the local products for limited profit.

Gujarat was the largest province of Harappan culture which mainly concentrated on maritime activity as several sites were located on the coastal belt (fig. 3). This province was the richest in semi-precious stones and these stones probably were supplied to entire Harappan civilization and exported to contemporary civilizations. Gujarat has a longest coastline measuring more than 1500 km and is dotted with several important Harappan ports described below:

Lothal

The word Lothal in Gujarati means 'the mound of dead'. It is situated 6 km away from Bhurkhi and about 83 km south of Ahmedabad. The geographical location is Lat. 22° 31' 25" N and Long. 72° 14' 25" E. The site was discovered in 1953-54 by S.R. Rao which was later extensively excavated. The site is famous for the highest number of seals and sealings found in India and a marvellous structure designated as Dock-Yard (Pl. 2). This may be the solitary example of this kind of structure found so far from Harappan sites.

The structure is a trapezoidal or sub-rectangular basin on the eastern flank of the ancient city of Lothal is located. The basin measuring 214 X 36 m is bound by walls of burnt bricks.

The length of embankment is 212.4 m on the west, 209.3 m on the east 34.7 m on the south and 36.4 m on the north. The original height of the wall was 4.15 m, but at present it is reduced to 3.3 m with 42 courses of bricks in the southwest corner. At the foundation level the width of wall is about 1.75 m and with two off-sets it is reduced to 1.2 m. A wharf which served the purpose of handling cargo, lies all along the western embankment wall. The warehouse near the south-western corner of Dock-Yard yielded 72 sealings, thereby proving that the Harappan seals were involved in trade activities (Rao 1991:131). The various ideas put forward about structure presently considered Dock-Yard are discussed below.

U.P. Shah (1960: 310-20) agrees that Lothal was a Harappan port but refuses to accept the said structure to be a Dock-Yard. In his opinion the structure was a drinking water pond. Leshnik (1968:911-22) suggests that the structure served as an irrigation tank. Further, he says that the anchors (fig. 4) are not real anchors but might have been used as counter weights required in a lift irrigation system meant for hauling water, which is practiced here even today.

The idea proposing the structure as a probable water pond was rejected considering the existence of an open drainage channel running from the citadel area, directly connected to the dock (Rao, 1979). Leshnik's (1968) arguments proposing the structure as an irrigational tank is also not free from flaws. By now it is well understood that the Harappans considered burnt bricks as precious material. Therefore, they could not have wasted millions of such bricks in raising an artificial tank for storing water for irrigational purpose. Besides, the nearness of river and nullah

to the habitation site renders the idea of irrigation tank unacceptable.

Possehl (1976) raised several questions about the proposed Dock-Yard location. One of them was the reason why Harappans failed to choose the river side of the town for Dock-Yard. This question may be valid in case of non serve areas. But in Rao's view Lothal structure was a tidal dock and the riverside generally got flooded during high tides. Such regular flooding could cause damage to the structure.

Suman Pandya (1977) has pointed out the location of Lothal from sea coast by 23 km and 12 above sea level, whereas sea level studies indicated 2 to 6 m higher sea level during Harappan period. Even with this level also sea water can not reach to the dock. But the recent work by M.S. University (1998) in Mahi river valley, suggests that the area is rising very significantly. In last 2000 years the area has risen to 6 m which indicate that this area is very unstable. Nigam (1988:20-21) analyzed the sediment samples from the Dock-Yard and suggested the presence of foraminifera, which indicates that it was a part of marine environment.

Another study of the petrography of Harappan pottery from Lothal (Panjwani, 1989) suggests the presence of fragments of foraminifera. Therefore, it can be concluded that prior to the settlement of Harappans, the site was under marine environment. And suggestion of marine environment of Dock-Yard may not be contemporary to the Harappan period.

Thus the structure at Lothal in all probability can neither be considered as drinking water pond nor an irrigation tank. However,

several aspects in the subtle design parameters of this structure still need reasonable explanations to accept as Dock-Yard.

Dholavira

The site was discovered by J.P. Joshi in 1967-68 and later extensive excavations were carried out by R.S. Bisht. Dholavira is a small village situated near the north western boundary of Khadir which is a large island in the Great Rann of Kachchh. The ruins of the Indus settlement locally known as Kotada (Lat 23 53' 10" N and Long 70 13' E), lie one km north-northwest of Dholavira. The Mandsar and the Manhar water streams flank the site on either sides along the north and south respectively. Harappan town Dholavira settlement is divided into three divisions namely citadel, middle town and lower town. Citadel and middle town have their own defence walls and all the three units together have enclosed by a common defence wall. The stone architecture is unique of this town and is not known from any other Harappan settlement. Another unique discovery is a banner like Harappan inscription where the letters are made of crystalline material which are unusually big in size. It should be noted that, here the Kachchh region is unfavorable for agricultural activity due to poor soil cover and paucity of rains. The area is also not rich in any mineral deposits. Under such unfortunate conditions which were those factors attracted Harappans to establish such a large settlement on an island leaving or smaller settlements to mainland of Kachchh? It appears that Rann was deep during 4000-5000 years BP and must have provided ideal conditions for navigation with a natural entrance from Kori creek where another small Harappan site Lakhapat was located. The submerged Rann might have provided the Harappans a natural excellent basin with an ideal water-column required for harbouring their ships which were

possibly operated both in river waters and high seas. In fact, various streams of this region converge at Dholavira and should have helped to ply the boats between Dholavira and mainland of Kachchh, North Gujarat and Saurashtra in the south. On the other hand, the Kori creeks might have been used to access the Arabian Sea for trade with the Persian Gulf civilizations. According to L.S. Rao (1992:95) the inter-regional trade activity of the Harappan empire subsequently gave rise to the international trade in which Dholavira occupied centre stage. In this trade mechanism Harappan at Dholavira must have effectively exercised their control in channelising the trade activity with other civilizations. Thus the Dholavira settlement may have probably enjoyed sound economy and wealthy living.

A seepage water pond at this site is a redeeming factor as it is a potable one and available all through the seasons. During monsoons this water overflows and a small nullah emanating from here gently merges into the Rann after a distance of few hundred metres. It is at this confluence, in the area on either side of this nullah, that a number of structures lie partially buried under debris. The architectural style of these structures is almost similar to those with that of the structures of Dholavira (Rao, 1992:96). Therefore, it may be assumed that the structures located on the edge of Rann, with an assured source of potable water, might have attracted the navigators to visit with their boats in Khadir Bet to store merchandise during transit period. However, it needs further investigation.

Kuntasi

The site is locally known as Bibino Timbo, located about 30 km northwest of Morvi and 3 km to the south-east of the present

village. It is spread over an area of about 220 m X 150 m with a maximum habitational deposit of about 7 m. The excavation was undertaken with twofold objectives: to trace the evolution of Late Harappan from the Mature Harappan; and to study the socio-economic organization of Harappans by employing the multiple approach.

The excavation revealed a two fold sequence of cultures viz, Period I: Mature Harappan (c. 2300-1900 BC) and Period II: Late Harappan (c 1900-1700 BC). The upper 2 m cultural debris belongs to the Late Harappan, and the lower 5 m cultural debris represents the Mature Harappan. Period I (Mature Harappan) excavations revealed that, the citadel mound was protected by double fortification wall of stone rubble set in mud masonry. It is nearly square on the plan (93 m N-S X 83 m E-W) and has a watch tower in the south-western corner. It is built of large flat stones at the base and also along the margin, whereas in the middle it has been packed with stone rubble. The bastion is square on plan and measures 8.5 m one side. The outer fortification wall was built of large boulders whereas the inner one had smaller stones. The inner wall emerges from the watch tower in the south-western corner, and is about 1 to 1.2 m wide except in the middle portion where it broadens to about 2.5 m, rendering it the appearance of a landing platform because of its slope. The excavation has yielded typical Harappan painted pottery, long tubular carnelian beads, cubical chert weights, terracotta cart frame, etc. Among pottery forms are the perforated jars, "S" shaped painted vases, goblets and bowls with short stud handle. The painted designs include geometric, floral and animal motifs and were drawn using black pigment. The outer fortification wall, which was partly exposed on the southern periphery takes a turn in the southeastern corner of the mound and runs towards north

where it broadens from 1.2 m to 3.3 m. Further up towards north there is a steep rise and a ramp of 4.10 m wide, joining the inner wall. In this part of the structure large stones are set in mud masonry which measures 9.5 m X 4.1 m. It appears that this structure served as a berthing for loading unloading cargo in boats anchored in the creek.

Thus the excavation of Kuntasi indicates that the settlement was not for agriculture but was a centre for trade and manufacture. The geomorphological studies suggest that Kuntasi might have been a creek port during Harappan period. The excavated landing platform, recovered anchor stones, etc., stand as a support to this suggestion.

Nageswar

Nageswar is in Okha taluka of Jamnagar district. The site lies on the northern and northeastern side of a large, perennial, fresh water lake, locally known as Bhimgaja Talav. Nageswar was one of the most important sites with respect to shell industry. Presently, the sea shore is about 4-5 km away from the site. During the third millennium BC, the sea level stand along the coast of Kachchh was nearly 4 m higher than the present (Gupta, 1977a: 181-191). Considering the elevated palaeo-sea level stand, the Nageswar may have been located quite closer to the sea. Gulf of Kachchh is rich in gastropod fauna and about 72 species of gastropod have been recorded from this area (Menon et al, 1961: 475-494). The most common species exploited for making shell based artifacts was *Xpyrum* (Shirwaiker and Parulekar, 1988: 134).

Gastropods found close to the shore and near coral reefs are often punctuated with bore-holes made by boring organisms like *Cliona* sponge (Hornell, 1951:7). On examining the ornaments and waste fragments of *Turbinell pyrum* gastropod collected from exploration and excavations site were devoid of bore-holes. This observation might suggest that the Harappans collected the shell of gastropod for ornaments from the sea bed fairly away from the shore. One study proposes that, shell-working craftsmen at Nageswar used boats to collect these gastropods (Hegde et. al., 1990:3) but the mechanism used for recovering the shells from the sea bed was not mentioned.

Bhimgaja Talav today is full of a special variety of grass. This grass is locally known as baru (*Sorghum halepensis*). The stem of this grass is 4 m to 5 m tall, thick, tough, hollow and tubular. When cut stems of this grass are put in water they display buoyantly. Such Buoyant grass stems are suitable for building small coastal vessel. Hayerdahl used similar grass to build a vessel for his Kontiki Expedition (Hayerdahl, 1981). It appears very likely that baru was used for building small boats, not only to collect gastropods from the sea bed but also for transporting the manufactured goods like shell bangles, pendants, beads, inlay pieces and ladles, to the markets in the Indus delta and beyond (Hegde et.al. 1990: 3).

Nagwada

The Nagwada site is located in the Rupen estuary in Dasada taluka of Surendranagar district about 3 km south of present Nagwada village (IAR, 1985-86:20). There are two more mounds holding Harappan relics close to the site. All the three are located on the top of dunes close to inter-dunal

depressions where monsoon run-off accumulates. Since the sub-soil water in this area is brackish these ponds may have served as the sources of potable water to the chalcolithic community just as similar ponds are used by the present villagers.

The thickness of the habitation deposit in these cuttings varies from 0.91 m to 1.04 m with five distinct layers which incorporated four structural phases of single culture. In the third phase rectangular structures built of moulded mud-bricks measuring 32 X 16 X 8 cm were unearthed. The brick masonry consisted of alternate layers of headers and stretchers. The entire deposit has yielded painted and plain sturdy red ware, buff ware and sherds of perforated ware. Among the forms encountered were dish-on-stand, some of them with the mature Harappan characteristic having concentric incised designs, stud-handled bowls, bowls without handle, basins, dishes, lids and large and medium sized storage jars. There were no sherds of the lustrous red ware. The other antiquities include a large number of ornamental stone beads together with their manufacturing waste, drill bits, long parallel sided flint blades, finished and unfinished shell bangles, a terracotta lump, querns, stone pestle and sling balls. Considering the antiquities recovered from the site, it was suggested that the settlement may have been a major centre for manufacturing shell objects, stone beads and which used the river route to supply the finished product to Kuntasi and other Harappan ports, trading with Sindh and Mesopotamia.

Shikarpur

Shikarpur, a Harappan site (Lat. 23° 16' N. 70° 41' E), is located about 2 to 3 km north of the eastern tip of the Gulf of Kachchh in Bhachau Taluka of the Kachchh District. Presently the

mounds are located at a distance of about 5 km to the south-west of the village Shikarpur. The site comprises of three interconnected mounds. A dried-up river-bed filled with sand is lies just west of the site. The location of the site near sea coast possibly indicate that Shikarpur was apparently a seaport during Harappan period.

The three mounds together measure 236 m east-west X 224 m north-south. The entire complex of mound is strewn with reserved slip ware, Harappan red ware and other allied pottery, small rubbles and occasionally antiquities like beads, chert blades, terracotta objects, etc. (IAR, 1987-88:14-15).

The pottery red ware, chocolate-slipped ware, cream-slipped ware, buff ware, polychrome ware, perforated, coarse gritty ware, etc. clearly indicate that the Shikarpur site has survived up to Late Harappan period. Another interesting ware was multi-graded glazed ware. A few sherds of painted black and red ware were also collected. Its main forms are storage jars, globular pots, dish-on-stand, basins, vases, vertical perforated pots, dishes, bowls, troughs etc. Two inscribed potsherds with Harappan script were also found at this site. One of them is a fragment of painted red ware with incised vertical fish symbol. The second sherd is a fragment of a chocolate coloured bowl with rhomboid symbol with a double cross, and geometric decorations like intersecting circles, loops, diamonds, chevrons, straight and wavy lines and dots. A number of terracotta bull, ram and toy cart frames, beads, ball and bangle pieces are also found. In spite of the limited excavation, hundreds of triangular cakes varying in size and shapes are found. Beads and pendants made of agate, carnelian, jasper and chert of different shapes were found. Steatite micro-beads have been revealed in plenty. Apart from disc beads and water beads of

steatite dentalium, chank and paste beads, bangles and chisels of copper, fragments of chert blades, fine drill bits are also noticed. All the above recoveries and observation suggest that Shikarpur site represents a shell industry.

Padri

The village, Padri Gohilni (Lat. 22° 22' N, Long. 72° 55' E) is located about 2 km from the Gulf of Cambay in Talaja Taluka of Bhavanagar District, Gujarat. The ancient habitation site locally is known as Kerala ne Dhoru. The site is 2 km south of the present village and measures 340 m X 210 m. Its southern edge is eroded by a tidal wave. A basaltic cliff of around 6 m high, running parallel to the coast provides a protection to this site from the severe tidal wave. The excavation for the first time yielded several evidences of pre Harappan elements in Saurashtra region (Shinde and Thomas, 1993:145).

The important findings include a tortoise-shaped copper lamp, upper half of a moulded terracotta human figurine and two red slip treated boat-shaped terracotta objects with perforations at the centre. The holes probably have been used to fix the mast (Shinde, 1992a). Another important finding is the recovery of a copper fish hook which is 14 cm long, with a barbed point and a loop on the other end (Shinde and Thomas, 1993:145). Such a large size fish hook should hold a fish weighing more than 50 kg. Similar type of fish hooks are being used even today. The excavator feels that Padri was the major centre for salt production.

Kalianpur

Kalianpur was a small Harappan settlement located north of Porbandar on the west coast of Saurashtra. It had served as a port in the Mature Harappan and Late Harappan times (Rao, 1991:153). Its total habitation deposit is only one metre. Perforated jar, convex bowl and dish-on-stand are indicative of the occupations in Mature Harappan period.

Khirasara

Khirasara, a fortified site yielding mature Harappan elements is located on the presently dried-up river bank about 5 km north of Netra in Nakhatrana Taluka of Kachchh district. The 3 m habitation deposit within the fortification yielded painted Red and Buff wares, terracotta balls, a steatite inscribed seal carrying the unicorn and a second largest chert tetrahedron measuring 13.02 X 13.00 X 13.01 cm is unique to Khirasara settlement. It weighs 5394 gm. Other important findings from Khirasara include a large truncated sphere of chert weighing 270 gm, a small truncated sphere of agate weighing 33 gm and a small cubical chert weighing 7 gm (Rao, 1991:163). These antiquities suggest that Khirasara was one of the prominent settlements of Harappans and appears to have played a significant role in trade and commerce.

Desalpur

Desalpur is situated about 20 km north of Khirasara on the bank of Morai river. The river joining Rann of Kachchh has eroded the large portions of the Harappan township since last three thousand years. The observations on the river sections indicate that, the erosion is still in progress particularly during monsoon

time. A structure exposed due to erosion was identified by us as a kiln. Two cultural periods have been identified, namely the Harappan and early historic. The houses were built adjoining the inner face of the fortification wall. Such an architectural plan has been interpreted as an anti-flood bolster rather than defence wall (Rao, 1991: 157). The important artefacts recovered from this site include a copper seal, chert blades, beads of semiprecious stones, steatite, faience, unique copper arrowhead and several ceramic wares. Among the ceramics wares, the reserved slip ware is believed to be of Mesopotamian origin. Other significant ceramic wares recovered were two polychrome wares, in which one has been painted in shades of sepia to black and another red-slipped polychrome has been decorated with black, purple and white designs. The similarity of these wares with those found in early Harappan sites of Sind probably indicate interactions between Harappans of Sind and Kachchh.

Lakhabaval

The Lakhabaval site is located on the northern shore of Saurashtra at about 9 km north-east of Jamnagar. This probably served as a minor port in Harappan period, supplying local products including shell objects and pottery etc. to the Kachchh Harappans.

Amra

The site is situated on the bank of a small stream 5 km away from Lakhabaval which is another Harappan settlement in northern Saurashtra.

Surkotada

Surkotada settlement is surrounded by small hillocks and lies on the banks of a seasonal stream about 3 km north-west of village Sanva, in Rapar taluka. The 5 to 7 m habitation deposit spreading over an area of 130 X 200 m has yielded vestiges of rubble fortification (IAR, 1964-65: 10).

The intensive exploration work carried out by Joshi (IAR, 1965-66:12) northern Kachchh area throw light on the different phases of the Harappan civilization. Important antiquities were recovered from Surkotada, Dholavira and a few minor sites. These sites have provided Reserved slip ware, white painted black and red ware, stud handled bowls and short chert blades. The reserved slip wares at these Harappan sites offer a parallel of early levels of Mohenjo-daro of Sind and Lothal of Saurashtra.

Apart from the above discussed sites, several other mature Harappan sites have been located on the coastal belt of Gujarat which are not yet explored. The next chapter, Late Harappan culture is also much more important as far as navigational aspects, trade activities of Gujarat during protohistoric period is concerned. Moreover, the Late Harappans represent the gradual declining civilization of once prosperous Mature Harappan.

The list of Harappan sites on the Coastal belt of Gujarat within a distance of 20 km from the shore. Both the Ranns are considered to represent the ancient shoreline.

Sr. Site	Taluka	District	Reference
01. Amra	Jamnagar	Jamnagar	IAR-1955-56, 7
02. Benap	Vav	Banas Kantha	IAR-1966-67, 8
03. Bhagatrav	Hansot	Bhroach	IAR-1966-67, 8
04. Changda	Matar	Khera	IAR-1972-73, 10
05. Dholavira	Rapar	Kachchh	Lothal, 702
06. Dhrosan	Kodinar	Amreli	IAR-1957-58
07. Dhulkot	Una	Junagadh	L.I. 116
08. Dudkha	Sami	Mehsana	IAR-1978-79, 5
09. Jatavadar	Rapar	Kachchh	
10. Kanthakot	Rapar	Kachchh	
11. Kerali	Jetpur	Rajkot	IAR-1958-59, 19
12. Kerasi	Rapar	Kachchh	IAR-1965-66, 14
13. Khambhodhar	-	Amreli	IAR-1957-58
14. Khari-ka-Khanda	Bhachau	Kachchh	IAR-1965-66, 14
15. Kotara	Khavda	-do-	IAR-1967-68, 9
16. Kuntasi	Morvi	Rajkot	IAR, 1977-78, 20
17. Lakhabaval	Jamnagar	Jamnagar	IAR-1955-56, 7
18. Lakhapar	Rapar	Kachchh	IAR-1965-66, 16
19. Man-verpura	Sami	Mehsana	IAR-1982-83, 28

Sr. Site	Taluka	District	Reference
20. Moruo	Rapar	Kachchh	IAR-1967-68, 17
21. Nageswar	Okhamandal	Jamnagar	IAR, 1983-84, 18
22. Pabhumath	Rapar	Kachchh	
23. Padri	Talaja	Bhavnagar	SAS, 1992, 55.
24. Panchasar	Hariji	Mehsana	IAR-1982-83, 28
25. Pirojpur	Sami	-do-	IAR-1978-79, 5
26. Pirwada-Khetar	Anjar	Kachchh	IAR-1965-66, 17
27. Prabhas Patan	Veraval	Junagadh	DDIC, 365
28. Ramvav	Rapar	-do-	IAR-1977-78, 20
29. Savani	Veraval Patan	Junagadh	IAR-1958-59, 19
30. Shibpur	Sami	Mehsana	IAR-1978-79, 7
31. Tarana	-	Jamnagar	IAR, 1960-61, 8
32. Todio	Lakhpat	Kachchh	Lothal, 699

LATE HARAPPAN PORTS

The concept for designating certain elements belonging to late Harappan has originated as early as the excavation of Harappa and Mohenjo-daro in Pakistan and Rangpur in India. Rao (1991:27) presumes that in 1900 B.C. most of the mature Harappan sites were destroyed by the flood forcing the inhabitants to seek new lands for settlement. So the post-flood decadent phase of Harappan culture has been designated as Late Harappan culture. The extensive explorations resulted a large number of Late Harappan sites. About 50 sites were discovered in Cholistan to the east of river Ghaggar (Mughal, 1982) in Pakistan. The major concentration of late Harappan sites was noticed between the Satluj and the Ganga, where about 450 sites have been identified between Satluj and Ganga rivers in Punjab, Haryana, Rajasthan and Western Uttar Pradesh and, around 400 sites of late phase have been recorded in Gujarat.

The refugees from Mohenjo-daro and southern sites of Sind region fled to Saurashtra and later occupied the interior of the peninsula (Rao, 1991:27). The late Harappan phase is

reflected in poor pottery and other equipment. About 80% of the Harappan sites in Gujarat belong to Late and Post Harappan period. It is interesting that the Late Harappans settled near sources of raw materials. For instance, conch shell was a very important raw material for making beads, bangles, ladles, vessels, weights and inlays. The gulf of Kachchh and the coastal waters of Saurashtra yielded high quality conch shell. Therefore, shell-working centres of Late Harappans like Bet Dwarka, Amra, Vasai, Kinderkheda and Prabhasa were located in this region. Dwarka and Bet Dwarka waters yielded pearl also. The extension of this culture up to the Narmada and Tapi valley might be due to availability of abundant semi-precious stones in those valleys. Thus, the Late Harappans had a definite affinity towards sites of raw materials for their settlement.

A few important late Harappan sites which may be directly or indirectly related to maritime activities are mentioned below.

Bet Dwarka

The Bet Dwarka island (22° 22' 12" to 22° 28' 36" N and 69° 05' 03" to 69° 09' 02" E), is situated in the Gulf of Kachchh about 5 km north of mainland of Okhamandal and to the east of Okha Port (fig. 5). It is famous for temples dedicated to Lord Krishna. Bet Dwarka is also known as Bet Shankhodhar. The island is a narrow crooked strip of sand and rocks of about 13 km long. The eastern part the of island is comprised of sand-hills and bushes and is called Hanuman point. The south-west half is a rocky tableland with fifty to sixty feet height. The lithological formations of Bet Dwarka mostly belong to upper Miocene and Pliocene marls and arenaceous clays which are capped by sandy limestone and hard calcareous sandstone. These indicate a littoral

to epineritic depositional environment, somewhat similar to that of the underlying Gaj clays (Merh, 1995:123).

Earlier excavation near Nilkantha Mahadev behind Dhingesvar Mahadev revealed an early historical settlement. The potsherd inscribed *Nandakasa* in Mauryan Brahmi script suggests a 3rd century BC or slightly earlier date for the settlement (Rao, 1988a:48). Rao (1987:27) has mentioned that in 1950 Madhav Sarup Vats, B.K. Thapar and himself explored the island and a few sherds suspected to be protohistoric but not specifically Harappan were found in Bet Dwarka. Onshore explorations (IAR, 1979-80:29) unearthed number of potsherds belonging to protohistoric period in the cliff sections near Siddi Bawa Pir, south east point of the island.

Onshore and intertidal zone explorations have been carried out by the Marine Archaeology Centre of NIO, Goa from 1981 to 1994. A few trial trenches were also laid to trace a proper cultural sequence. The most potential sites where a large number of antiquities were recovered are BDK-I, II, VI, and IX.

The antiquities recovered from Bet Dwarka may be divided into three categories belonging to following three broad periods namely, 1) Protohistoric period, as represented by seal, two inscriptions and late Harappan pottery, 2) Historic period, represented by coins and pottery and 3) Medieval period. Due to lack of stratigraphic control the shell objects are described separately without assigning to any particular period.

Period I (*Protohistoric Period*)

Protohistoric period in Indian Archaeology represents the Indus Valley civilization, Chalcolithic culture of Deccan and early Megalithic culture of south India. A time span of the protohistoric period generally ranges between 3500 to 1000 BC based on scientific method of dating. The earliest settlement in Bet Dwarka island may correspond to the later phase of Indus civilization (Rao, 1988a:72). The following paragraphs describe in detail the various findings and antiquities recovered during Bet Dwarka exploration.

Seal

A seal made out of conch shell is one of the most important dated antiquities recovered from the Island (Pl. 4). It is 20 X 18 mm in size and has a three headed animal motif representing a short-horned bull a unicorn and a goat. The seal has a perforated button on the back for holding ring and is similar to one reported from Mohenjo-daro (Marshall, 1973, seal no.382). It was found during the underwater excavation, from layer 2 of a trench UW 6 measuring 1 X 1 m. The trench was laid 400 m seaward of the rocky promontory projecting between BDK I and BDK II (Rao, 1990: 72). A doubt has been raised that the shape and details on the seal could not have remained intact since it was found underwater (Tripathi, 1996:53). Contrary to this doubt, several well preserved terracotta and ivory objects have been found from the bronze age shipwrecks in Mediterranean waters (Throckmorton, 1987:32) which were more fragile material than the seal of Bet Dwarka. In addition, the seal is made of conch shell which was formed in the marine environment conditions. This, however can not be expected to degrade while underwater or within sediment. Therefore, its preservation as well as location is beyond

any doubt. In light of the above mentioned facts, the doubt raised regarding the intactness of the seal (Tripathi, 1996) does not have any validity and is rejected without further debate.

Inscriptions

Two protohistoric inscriptions on potsherds were found from Bet Dwarka island. One has seven characters (Pl. 5) whereas the second one (Pl. 6) found in 1994 has two characters (Sundaresh and Gaur, 1998). Former was recovered from the intertidal zone (Rao, 1988a:82) while the latter was from onshore area. The first inscription was deciphered as mahagacha-shah-pa and was interpreted as "Sea Lord Protect" (Rao, 1987:52) and other one as Baga meaning "God" (Rao, 1999). It is difficult to comment on the decipherment of this script till all the Harappan scripts are decoded conclusively. However, Tripathi (1996:53) disputes the sanctity of the script on the pot sherd since he assumes that the script was probably subjected to severe erosion in the intertidal zone. It should be noted that the inscription on the potsherd collected from onshore area is quite intact and deeply engraved. Though, the one found in intertidal zone has been subject to erosion, the trace of original script can be still understood. Hence, Tripathi's (1996) argument regarding the sanctity of the script on potsherd can be ruled out. By relating the inscription on these potsherds may be useful in dating the habitation of Bet Dwarka island.

Pottery

Pottery has been collected from both onshore and intertidal zone of Bet Dwarka (Gaur, et.al. 1994:165). Most of the pottery found here is fragmentary because of wave action. Some shapes

characteristic of protohistoric have been recovered. Some examples include: perforated jars, carinated dishes and parts of dish-on-stand in sturdy red ware, bowls in red ware and grey ware and high-necked jars in coarse red. Most of the protohistoric pottery of Bet Dwarka is comparable with the pottery of another Harappan settlement at Rangpur IIC-III, which has been studied extensively. Moreover, the pottery recovered from Bet Dwarka have a close affinity to the pottery from almost all Mature to Late Harappan sites.

The red ware sherds are sturdy with a red core, while the grey ware has a light to deep smoky core. The clay used for the Red Ware is fine and the pots were baked to a high temperature. In the case of big storage jars the clay is coarse. The pottery is mostly wheel-turned. The pots with a bulbous or carinated body were turned on a wheel and after drying, were beaten to the required shape without touching the rim and neck.

The sherds recovered from the sea bed and intertidal zone of Bet Dwarka were wave rolled and have pitted surface. They have lost all evidences of surface treatment and decorations including paintings. The pottery collected from the onshore is decorated on the shoulder and rim. The painted decorations appear only on the red ware and consists of horizontal bands and roundels on the bowls. The colours used in pottery decoration are black and deep brown shades.

Pottery Description (fig. 6)*Jars*

1. Thick storage jar with a heavy beaded rim and bulbous body, ill fired and coarse fabric. BDK-II 85 (compares with RGP III, type 61).
2. Jar with a bulbous body and sharp projected rim, well fired and coarse fabric. BDK-II-85 (compares with RGP IIA, type 3).
3. Jar with a wide mouth, splayed beaded rim and bulbous body. Well fired and fine fabric. BDK-VI 88 (compares with Lothal B type 237 B).
4. Jar of medium size with a raised neck and beaded rim, well fired, medium fabric. BDK-IX 90 (compares with RGP III, type 70).
5. Body part of a perforated jar with a medium thickness, well fired medium fabric. BDK-I 85.

Bowls

6. Bowl with a sharp and an everted rim, blunt-carinated shoulder, red slip and painted in deep brown colour with roundels. Well fired and fine fabric. BDK-VIB 87 (compares with RGP IIC, type 10 a).
7. Bowl with a thick rim and straight sides, slightly convex profile, well fired and medium fabric. BDK-IX 90 (compares with RGP IIB, type 29).
8. Convex sided bowl with a thick rim, red slip, well fired and fine fabric. BDK-IX 90 (compares with RGP IIC type 10 a).
9. Convex sided bowl with a thick rim, red slip, medium thickness, fine fabric and well fired. BDK IX 90 (compares with RGP IIC, type 10B).

Dish

10. Shallow dish with a projected rim and prominent carinated shoulder, ill fired and coarse fabric. BDK-II 85 (compares with RGP IIA, type 76a and also with Lothal A 42f).
11. Dish with a projected sharp rim, blunt carinated shoulder, well fired and fine fabric. BDK-VI 85 (compares with RGP IIA type 67a).
12. Dish of a dish-on-stand, featureless rim, non-carinated shoulder, well fired and fine fabric. BDK-VIB 87 (compares with RGP IIA, type 77 and also with Lothal A, type 43).

The abundance and description of above pottery types suggest that the site was well populated in beginning of 2nd millennium BC and was contemporary to protohistoric settlement at Rangpur in Gujarat. The X-ray diffraction analyses suggest that the mineral composition of the pottery had a close affinity to the local clay. This compositional similarity provides the evidence to suggest that the recovered pottery from Bet Dwarka are exotic. Thus it appears that the protohistoric Harappans of Bet Dwarka were well aware of the properties of local clay and its utility as pottery raw material (Hashimi, et.al, 1994).

Period II (Historical Period)

After a long interval of about 1100 years, the island once again appeared to have occupied around in 3rd century BC. The early historical settlement of Bet Dwarka contains several remains of trade contact with the Roman world around the beginning of Christian era. Since Bet Dwarka region was very rich in conch shells, the main source of Harappan economy, this probably did attracted historical period people to reoccupy the island. A large quantity of pottery and few coins were collected from onshore and intertidal zones during our marine archaeological explorations.

Coins

Four coins were discovered from the Bet Dwarka island. Three of them are of copper while another is of lead. Two copper coins are identified as belonging to Kushana period, while the other two cannot be identified due to missing figures and scripts. The description of each coin is given below.

1. Kushana period (1st century AD) copper coin (weight 15.98 gms) is well preserved but it is severely rubbed.

Obverse: A king wearing diadem and helmet standing on left side holding a sword in his left hand which is tucked on waist; sacrificing altar. Script is not visible.

Reverse: Standing Siva wearing head-dress and drapery over shoulder and holding trident in right hand. Behind Siva is a bull.

2. Kushana period (1st century AD) copper coin (weight 3.68 gms) with corroded top portion on both sides.

Obverse: A bearded king wearing a conical shaped helmet; offering oblations with a standing posture at altar with right hand which also holds an ankusa faces left; fillet over flowing the shoulder, hold a spear in the raised left hand and wears a tunic. Script is not visible.

Reverse: A male with diadem standing frontally facing left, wears a tunic and a mantle and short boots; wears a low cap tied with a ribbon; extended right hand makes a peculiar two fingered gesture; armed with a short sword held in the left hand which rests on the waist. Script is not visible.

3. Not identifiable lead coin with 3.49 gms weight.

4. Lead coin with 2.19 gms weight.

Obverse: 12 spokes wheel,

Reverse: not identifiable because the sides were rubbed.

Pottery

The pottery of historical period generally found itself mixed-up with the protohistoric period. However, it can be identified and separated on the basis of shape and fabric. The pottery belonging to this period comprises of red slipped ware, red polished ware, coarse red ware and amphorae ware. Pottery was mostly wheel-turned, but imperfectly baked as revealed by smoky core in some pottery. A few important shapes are described below.

1. Storage jar with a flared rim and bulbous body, short neck, red slip, ill fired and coarse fabric. BDK-I 88.
2. High-necked jar of medium thickness with out-turned and deep undercut, concave neck, red slip, well fired and medium fabric. BDK-II 85.
3. High-necked jar with a beaded rim having black bands on both the sides and some vertical lines also on the shoulder, well fired and coarse fabric. BDK-VI 85.
4. Bowl with nail headed rim, ill fired and medium fabric. BDK-II 85.
5. Convex sided bowl with a sharp rim and footed base, inside a depression on the base. BDK-II 85.
6. Deep dish with a beaded rim, well fired and medium fabric. BDK-II 85.
7. Amphora with straight sides and beaded rim, broken handle, well fired and medium fabric. BDK II-85.

Conch Shell Industry

The conch shell industry had played a vital role in trade and commerce during Harappan period. A large number of conch shell objects and bangles have been collected along with the protohistoric and historic objects. Therefore, it is difficult to assign dates for different shell bangles.

The shells collected from Bet Dwarka have been identified as *cyprea ocellata* linn, *murex ramosus* linn, *murex virgineus* roding, *babylonia epirata* linn, and *xanus (turvinalla) pyrum* (linn) (Shirwaiker and Parulekar 1988:133). The apex of the shell was cut and the columella was rendered into a hollow tubular piece to give it a round shape. This rounded columella was cut in to smaller rounds to produce bangles. Then the bangles were polished with stone. These shells appear to have been cut with the help of a toothed saw, as the cut surface closely resembles the saw cut surface. Saw marks are also seen on a number of waste columella.

A massive wall, 558 m in peripheral length, was discovered in the central sector. A small trench (1 X 1.2 m) was dug on the southern face of its northern arm and 9 courses of masonry was found intact. The outer faces of the wall had wedge-shaped stones with rubble filling. During high tide the wall lay submerged under a water column of 1.5 to 2 m. The structure was thought to be of protohistoric period (Rao, 1990). However, a thorough investigation and discussion with local fishermen in the area force us to relook into this structure as a whole. Subsequently, the evidences gathered are directed towards the more recent age of < 100 years and the purpose of the structure was to trap the fish. This is a common practice of fishing in many parts of India even

today. The northern sector at Balapur where the old custom house stands, yielded Late Harappan pottery in the lowest strata and post Harappan, Early Historical and Medieval pottery in the upper strata.

Recent Explorations in Bet Dwarka Island in 1997-98

Onshore Exploration: Nearshore explorations were carried out near Khuda Dost tomb of Bet Dwarka and an early historical site was located which gets submerged during the high tide and is protected from direct wave action (Pl. 8). A few potsherds in the section were noticed.

A protohistoric settlement was noticed near Nilkantha Mahadev temple. Recent digging by a local authority for building a water tank yielded large quantity of late Harappan pottery. While in explorations of BDK-I and II areas, it was observed that the shoreline touches the lower portion of the protohistoric habitation during highest high water. During the low tide two terraces were noticed which usually submerged during high tide.

A high cliff towards north of present Bet Dwarka jetty revealed the habitation of medieval period. A large quantity of pottery was also noticed in intertidal zone area.

Intertidal Zone Exploration: Intertidal zone explorations were carried out to the north and south of present Bet Dwarka jetty. One broken rectangular stone anchor was noticed at northern side of the jetty. Its lower half is preserved with two rectangular holes over the rough surface which is reddish in colour. It is made out of locally available conglomerate rock. Two worn out iron cannons were noticed which are presently used as mooring for the fishing boats. Further north, near the *Pir tomb*, a square ocher colour,

smooth surface having a single hole, was found partly buried in sediment. Another triangular stone (Pl. 16) anchor was noticed in intertidal zone of Aramda about 5 km south of Okha.

In the southern side of the jetty, two stone anchors and two iron cannons were noticed. One of the triangular worn anchor stone has uneven surface. The stone anchor has three holes, two square holes on bottom side and a circular, partly broken hole on the top portion. The anchor is made out of locally available calcareous rock of grey colour. Another rectangular stone anchor was found buried in clays. This is one of the heaviest anchors found in Bet Dwarka. Two holes in the bottom are square shaped and the hole at the top is circular. Rope marks within the circular hole were evident. This anchor stone was cut out of locally available yellow sand stone having a smooth surface. Both these anchors were retrieved. A partly buried iron cannon was noticed in the intertidal zone. Another corroded cannon was found buried in the sediments and was used as mooring. This is the first report of anchor stones from the Bet Dwarka area. The occurrence of these anchor stones in Bet Dwarka has a major bearing to understand the maritime significance of Bet Dwarka and its relationship with Dwarka.

Offshore Exploration: Encouraged by the findings in the intertidal zone we undertook offshore explorations in shallow waters. In total 15 dives were carried out with an interval of 10 hours. The diving area was on the west of Bet Dwarka and was divided into two zones.

Zone 1. The area falls north of present Bet Dwarka jetty. The total area is about 2500 sq. m. Water depth varies from 1.5 m to 6 m. The sea floor is composed of clay with exposed rocks often with

growth of barnacles. Four triangular stone anchors were found in this zone (Pl. 7). Three of them were intact while the last one was broken. These anchors were made out of locally available limestone. The surface of these anchors is highly uneven and rough.

Zone 2. The area is located to the south of present Bet Dwarka jetty. Water depth varies from 2 to 4 m. The seafloor is composed of only barnacle rock exposures. The diving operations could not yield any worth mentioning archaeological artefacts.

The water around Bet Dwarka is rich in conch shells. The conch shells were economically very important for the Late Harappans. Therefore, this area might have attracted the settlers. The discovery of seal and Indus inscriptions clearly demonstrates the presence of a habitation belonging to early 2nd millennium BC. The settlement on the southeastern side of the island apparently got eroded by the wave action as evident from the cliff section facing towards sea. A large quantity of pottery was recovered from the intertidal zone of southeastern side indicating the settlement as well as subsequent destruction by wave erosion. The available evidences suggest that the present sea level at Bet Dwarka is slightly higher than compared to protohistoric period. However, it is difficult to explain the causes of sea level rise. The thin deposition of protohistoric habitation, absence of land suitable for agriculture, suggest that Bet Dwarka probably had acted as a temporary seasonal camps for fishing. Later around 1500 BC the site seems to be deserted until around 3rd century BC. The reasons for such abandoning is unknown. However, the period around 3rd century BC might have attracted the settlers once again because of its strategic location to carry out trade with the emerging Roman empire.

Dwarka

Dwarka is one of the most religious centres for Hindus and considered as one of the four *Dhamas* in the extreme west coast of India. The site is located (22 14'N, 68 58'E) in Okhamandal taluka of Jamnagar district. There are several views on the location of Dwarka of Mahabharata period. Three places have been claimed as original Dwarka by various scholars.

1. Modern Dwarka, near Okha in district Jamnagar.
2. Junagadh or ancient Girinagara.
3. Mula-Dwarka, a small island-about 35 Km from Prabhas Patan, on the south-west coast of Saurashtra, in Junagadh district.

The present topography of the Dwarka has a close similarity to the descriptions of the area in *Harivamsa* and the *Bhagavata Purana*. It was described as flat, rocky land with copper red sandy patches hosting thorny bushes. Once the land was under the sea. *Kusa* grass which played an important role in *Yadavas* downfall, also grew here once in abundance. It was a natural ancient harbour, and probably attracted new comers, perhaps refugees, invaders, or traders. The literary meaning of Dwarka is a gateway (Sankalia, 1966). Dwarka has been described by the author of the *Periplus*, a Greek writer of 1st century AD, as *Barke* which is located in the Gulf of Kachchh. As this place has found a reference in *Periplus*, then probably Dwarka enjoyed the status of a prominent sea port.

From the above statement it is certain that the present Dwarka would have been the original Dwarka of *Mahabharata* period. Archaeological findings recovered from the trenches dug

for new foundations for houses attracted a local medical Doctor Jayantilal Thakkar. He used to collect the remains of pottery and coins dated to be early historical period. But first systematic land excavations were conducted by Z.A. Ansari and M.S. Mate of Deccan college, Pune in 1963 and date the earliest occupation of Dwarka as 1st-2nd century BC/AD. In 1979-80 S.R. Rao on behalf of Archaeological Survey of India, demolished a modern building in the forecourt of Dwarkadhish temple. The clearance operation revealed the heavily moulded plinth and delicately carved walls of a Vishnu temple dated to be of 9th century AD. Further excavation revealed two more phases of the temple dated to the 1st century BC/AD (Rao, 1990:63). On further excavation the evidences of destruction of settlement were noticed. This destroyed settlement is believed to be of 2nd millennium BC (Rao, 1990).

Since 1983, Marine Archaeology Centre of National Institute of Oceanography, Goa has been carrying out underwater explorations off Dwarka. A large number of man made structures were noticed during the explorations. Most of the structures are fragmentary and the parts were found littered in a major part of the exploration area.

In 1989, Geophysical survey was carried out at 3 to 20 m water depth. The echograms reveal the seabed to be generally uneven. The most prominent feature on the seabed is the occurrence of channel traversed by several cutting (Vora, et. al. 1991:32-38). The results of explorations carried out in Dwarka waters in 1997-98 are described below.

Initially the search for submerged objects of archaeological interest commenced with using the Surface Supply Demand Diving Equipment (SDDE). The first attempt for exploration was

made close to the transitline of Samudranarayana and Dwarkadhish temple. Based on prior experience, diving operations were extended gradually towards the deeper water as well as to the right of the transit line. A circular search pattern was also adopted. The important objects such as bastion, fallen wall, anchor etc. were clearly marked using marker Buoys. The Buoys were numbered serially and positions were obtained using sextant and were plotted on the chart. Underwater scooter was used for searching the objects which were observed during earlier expeditions in order to cover a large area visually. The objects were recorded using, underwater drawings and underwater photography. All details were catalogued after description.

Onshore and Intertidal Explorations

In addition to underwater exploration, the onshore and intertidal zone survey was also carried out. The results are listed below.

- A large sand dune was located on the mouth of river Okhanadi and the local people have a strong belief suggesting that, the river was navigable around 2000 years BP. However, no archaeological objects were noticed in this area.
- A single-holed stone object, circular in cross section with a hole running through the centre to the full length was noticed and photographed. The dressing appears to have been made using chisel as the chisel marks were noticed on its surface. This solid circular single holed stone is cut out of conglomerate. It is conical in shape and an across circular hole with chisel marks was noticed. It is made out of conglomerate rock, with reddish appearance.

Five stone anchors were noticed at a depth of 0.5 to 1 m during low tide. One of them was triangular and the remaining form was rectangular. One of the rectangular anchor is the heaviest among the stone anchors found in Dwarka waters so far. It has two rectangular holes at the bottom and a circular one on the top. It is made out of yellow sand stone having uneven surface. The second rectangular anchor has two square holes on the bottom side and a circular hole on the upper side top. The third rectangular anchor was also found at the southern side of the triangular anchor but is broken. The fourth rectangular anchor is a broken part of the whole stone, wherein only its upper portion can be seen. One circular hole is noticed in the upper section. These anchors are made out of locally available rocks.

Offshore Explorations: Offshore explorations have been carried out at Dwarka between Lat. 22 13' 27" to 22 14' 08" N and Long. 68 57' 24" to 68 58' 06" E (fig. 7). The diving operations were undertaken in an area of 1.6 sq. km. In all 173 dives were carried out at various depth with a maximum of 23 m, spread over 123 total divers consuming nearly 123 hours. The area was divided into 5 zones for convenience and a meaningful description of the archaeological findings.

Zone no. 1 Water depth 4-6 m, Buoy nos. 2, 3, 8, 10, 13, 14, 15, 17, 21 and 24.

Observation: This is the site which was known earlier to us. A large number of scattered stone blocks were noticed and most of them were found partly buried in sediments. During our earlier survey these blocks were completely exposed on the sea floor. Within last 3-4 years, due to dredging activity, the blocks are now buried under the sediment. Two fallen walls marked as Buoy nos.

10 and 3 were noticed and a L-shape wall marked by Buoy no. 15 were recorded. The length of this wall is 3.25 m in north-south direction and 2.50 m in east-west. Two courses of stone blocks in north-south direction and three courses of blocks in E-W direction are evident. The maximum width of the wall is about 50 cm. The average size of the stone blocks is 100 X 50 cm. A few more scattered blocks were also noticed near to this (Pl. 9 & 10). Several rectangular stone blocks probably the part of earlier existing wall were noticed at Buoy no. 3, and most of them were buried in the sediments. The average size of the blocks is 90 X 50 cm. A number of stone blocks similar to former ones were found at Buoy no 10. In addition, around Buoy no 13 several scattered stone blocks were also found having two sizes are 50 X 20 cm and 100 X 50 cms.

Three circular structures were marked as Buoy nos. 8, 13 and 24. The structures at Buoy 8 and 13 were buried in sand while the one at Buoy no 24 was exposed, having three courses of blocks. The total height of this structure is 85 cm and width is 40 cm. These structures have been considered as part of a bastion by Rao (1987, 1990). Several other rectangular and square stone blocks were also noticed in the surroundings. A triangular stone anchor was found lying near Buoy no. 2. Remaining Buoys represent a large number of rectangular, square and irregular stone blocks partly buried in the sediment. A stone block with Gujarati script was marked by Buoy no. 17. Considering the scattered structures, it appears that the study area is a highly promising zone in view of the archaeological findings.

Zone No. 2 Water depth 4-7 m, Buoy nos. 12, 19, 20, 25, 26 and 27

Observation: The area is located on the right of the transitline of Samudranarayan and Dwarkadhish temples. The entire area is rocky with a few sand patches. A rectangular stone anchor and a single-holed stone object were noticed and marked with Buoy no 12, which are lying in the sandy channel and made of locally available limestone. A triangular stone anchor with two holes was noticed at Buoy no 19 (Pl. 11). The anchor has trapped in the rock and cannot be removed easily. The material of this anchor also appears to be limestone. The Buoy no. 20 marks a grapnel stone anchor. The two holes in the lower side of this anchor are square and one circular hole on the upper side. The anchor is made of yellow sand stone. A broken triangular and two grapnel stone anchors were noticed and marked with Buoy nos. 25, 26 and 27. The anchor at Buoy no. 26 is one of the heaviest anchor noticed in Dwarka waters. It is preserved wholly with a circular hole in the upper portion and two rectangular holes in the lower side. All of them were made of locally available limestone. The discovery of abundant anchor stones of varying size and shape (fig. 8 & 9) indicates that this region was the anchoring place of ancient boats in Dwarka waters.

Zone No 3 Water depth 8-11 m, Buoy nos. 6, 11, 12 and 23
Observation: This is the ridge area. A rocky cliff running parallel to the shoreline for more than 100 m with an average height of 1.5 to 2 m was noticed in water depths of 9-11 m. A few holes were also seen on this ridge. It is presently difficult to ascertain the origin of these holes on the rocky cliff. Buoy nos. 6 and 12 mark these holes. The foot side plane is filled with fine white coral sand in the southeastern side of the ridge. A heavy growth of marine vegetation was noticed on the ridge. A stone object with a hole

partly buried in deep sediment was found (Buoy no 12). A two prong iron anchor was found lying on the floor adjacent to the foot of the ridge. One grapnel stone anchor was also found (Buoy no. 11) near the ridge area. It has a circular hole on the upper portion and two square holes in the lower portion.

Zone No. 4 Water depth 13-15 m, Buoy nos. 4, 5 and 7

Observation: This area is located on the right side of the transitline. The distance from zone 1 is about 250 m towards offshore. This area was explored for the first time during 1997-98 to trace any new archaeological evidences to establish Late Harappan navigation, and continuation of the ridge structure observed in zone 3, but no significant objects were noticed. The entire area is rocky with intermittent sandy patches. A few channels were noticed with a heavy growth of vegetation. A search for the continuation of the ridge towards the light house revealed a few dressed stone blocks (Buoy nos. 5, 4 and 7).

Zone No 5 Water depth 7 m, Buoy no. 22

Observation: The area was located at the extreme west of the diving area towards the light house. Entire area is flat and rocky, covered with about 1-2 m height vegetation. A single-holed stone object of conical shape was found lying in the sandy channel (Buoy no. 22). The height of the object is 45 cm and its diameter on the base, 35 cm. The diameter of the hole is 20 cm. This is made up of calcareous rock.

Discussions

The findings of present exploration are discussed below in light of earlier explorations and findings from surrounding archaeological sites.

Structures: Most of the structures which were recorded as well exposed in zone 1 during 1984 to 1991 explorations, are now found partly buried in the sediment. Just in a period of ~10 years, some of the structures have been buried completely. This observation suggests that the recent dredging activity in Gomati river mouth resulting in redistribution of sediment might be responsible for the observed burial of the structures. Most of the structures were found scattered thus making it difficult to understand the proper layout. A L-shaped wall (Buoy number 15) suggests that the structure was rectangular in plan. A block near the structure bearing inscription in Gujarati, suggests a date of medieval period.

Abundant stone blocks were recorded in an area just opposite to Gomati river mouth but no structures were found beyond 7 m water depth. Some structures and stone blocks which marked by us during 1986-87 survey in the intertidal zone are now found buried under well consolidated, beach sand. Therefore, it is suggested that the intertidal beach sand consolidates at a faster rate near Dwarka due to unknown reasons. In light of the above observation, an argument can be placed in respect of these structures (blocks). Whether, the blocks found on the intertidal zone belong to any ancient structure. If yes, then they also could have been buried underneath the fast consolidating intertidal sand. Therefore, an alternate explanation could be suggestive of more recent age for the structure built by these blocks. The fury of sea resulting in devastation of structure, might have resulted in scattered blocks in this zone. However, a detailed investigation is required to arrive at any meaningful conclusion.

Three tilted semicircular structures were also found in this region. Out of these, two were scattered and one was intact. The L-shape blocks usually give the shape of a bastion. These bastions

are quite different from those found at various protohistoric settlements in Gujarat province. It has been observed that protohistoric bastions were mostly constructed with mud bricks, square/rectangular in shape and large in size. Structures built only with the stone blocks were not found from any of these sites. The fine finishing of stone blocks used in the bastions and the curved shape may suggest a more later period for this structure. It should be noted that, the curved bastions came into existence around 10-11 century AD in India. Thus the time period of bastion structures need to be carefully studied before arriving at any conclusion.

The dating of the above findings has been questioned by several scholars. L.B. Kenny (1993:99) opines "unless archaeology, an auxiliary science of history, is used scientifically, along with literary sources, the excavations of Dvaraka would continue to be a pseudo-scientific as they appear to be today. History is interpretation based on human reasoning, not on emotion". In light of the up-coming criticisms regarding the validity of date for structures found in submerged Dwarka, there is a urgent need for additional evidences to prove the submerged Dwarka as a 14th century BC port town.

Submerged Cliff: A significant finding is the submerged rocky cliff (ridge) in water depth of 8-11 m. The highest point of the cliff section measures 2 m in height from seabed. The holes on the upper projections of the ridge along with the stone anchors spread in the nearby ridge area, suggest that the ridge may have served as an anchoring jetty during the ancient period. If this suggestion is true, then the sea level should have been ~12 m below the present level, i.e. a rise at the rate of 3m/1000y in the past 4000 years, which does not correspond to the available sealevel

fluctuation curves. Therefore, it is suggested that, the submerged jetty probably indicates a cumulative effect of lowering sealevel and an intense tectonic disturbance in the area. The location of this structure, after lowering the sea level by ~12m around 4000 years BP, falls in the zone which is exposed to high energy open ocean. Considering, the majority of ancient port locations in more secured and protected areas, the location of present submerged jetty appears to be very unfavourable one for the late Harappans. Therefore, until substantial evidence is accumulated to prove that structure as a jetty, the speculation regarding the said structure would persist.

Single-holed stone Object: Three single-holed stone objects (fig. 10) from offshore and one from onshore are reported here (Pl. 15) These are mostly conical in shape. Though it is suggested that these objects have been used as anchors like any other stone anchors, still their usage remains an enigma. This artifact could have been used approximately as the step of a mast, or as an anchor for rocky and coral reef bottoms, or any other navigational application. The various sizes recorded for this object may correspond to different sizes of the boat.

Anchors

The stone anchors are an important tool for nautical archaeology as they help to study the ancient seafaring activities. In marine Archaeology the anchors have been considered equally important as the potsherds in land Archaeology (Frost, 1973). More than 50 stone anchors have been recovered in Dwarka waters (fig. 8, 9) and few of them were retrieved, during the various explorations since 1984. The different types of stone anchors recorded have been described in preceding paragraphs.

The large number of stone anchors found here suggest that Dwarka must have served as an important port in the past.

Typical triangular 3-holed stone anchors are among the important findings of the exploration (Pl. 12). Two square fluke holes in the basal side of the anchor were meant for fixing wooden stakes. The third circular hole in the upper apex portion was used to insert a wooden post for tying the rope for lowering or hauling the anchor, is designated as rope hole (Rao, 1990:75). Similar 3-holed anchors of Late Bronze Age were found at Ugarit in Syria and Kition in Cyprus (Frost, 1985:400).

Recent marine archaeological explorations at Malwan and Vijaydurg in Sindhudurg district of Maharashtra brought to light a number of different type of stone anchors, for the first time in this region. Presently, 8 grapnel type anchors are found serving as lintel of windows in the parapet wall of the Vijaydurg fort of Maratha period (Technical Report, 1996), indicating their usage quite prior to Maratha period. Further, mooring stones have also been identified on the abandoned Dock-Yard located on the Vaghotan river bank.

The excavation of 12th-14th century AD port at Periyapattinam in Ramanathapuram district of Tamil Nadu yielded identical rectangular three holed mooring stones on the bank of the river Kappalaru. Further, the information obtained from the villagers suggests that these stones were used for tying the boat. Similar stone blocks were also noticed at Vijaydurg and Dwarka (Rajan, Personal Communication).

Two prismatic stone anchors from the south of Tamil Nadu have been reported which are similar to Dwarka rectangular

anchors. According to Dr. Kapitan of Sicily, rectangular stone anchors were typical of Persian origin (Rajamanickam, 1992). On the other hand, Frost (1985:362) suggests Arabic origin for these anchors and calls them proto-grapnel type anchors. According to Raban (1990), these type of anchors might represent those used in coralline sea bed which are characteristic of Indian waters. Thus grapnel type of anchors need not be of Arab origin or designed by Arab seafarers.

Similar type of anchors have been found in the Red Sea at Lone Mushroom wreck (Raban, 1990), Kilwa Kisiwani and Mogadishu on the East African coast (Chittick, 1980:73-75) and the Siraf on the Persian Gulf place (Whitehouse, 1970:141). The occurrence of grapnel type stone anchors in various regions probably suggests that, this type might have been the most efficient anchor type, designed by almost all seafarers during those days irrespective of the regions. This observation further indicates a well established marine communication between different settlements and an exchange of designs for maritime activity. In addition, basaltic grapnel anchors were also found in Dwarka waters (Pl. 13). Surprisingly, basalt is not a local rock type and its nearest occurrence is on Junagadh hill. It means that, the Dwarka people were obtaining raw material for anchor cutting from adjacent areas in addition to local limestone.

Somnath-Prabhasa

Somnath is situated (20° 53'N and 70° 24'E) on the southwest coast of Saurashtra at the mouth of the river Hiranya or Hiran. The port town of Veraval is only 2 km from Somnath. The Prabhasa is mentioned in the *Mahabharata* as Prabhasatirtha (Law, 1967: 345). The *Bhagavata Purana* referred to this place as

sacred one and the river Saraswati flows towards the west and the town was situated on the sea shore. Further, the *Purana* says that Lord Krishna undertook a sea voyage from Bhruhukachcha to Prabhasa (Epigraphia Indica, 1981).

The Somnath-Prabhasa has nearly a straight coastline revealing a vivid manifestation of marine aeolian and fluvial processes that have resulted in a number of important geomorphic land forms, such as the near shore zone characterised by the formation of recent alluvium deposits, sand bars, mud flats and mangrove swamps. The coastal zone is covered with beach and littoral sands, oyster beds and sand dunes (Oceanographic Studies off Sutrapada, report, 1985).

Land excavation was undertaken by M.S. University Baroda in 1956 and 1965, later by Deccan College, Pune (in 1971-72 and 1975-76) revealing four cultural sequences (IAR, 1971-72, 1975-76). Period III needs a special mention here as it belongs to late Prabhasa period (contemporary to Late Harappan). The most noteworthy feature of this period is the discovery of an extremely complex structure very close to the river Hiran built using boulders of miliolite limestone set in mud mortar. A close examination of the artefacts recovered from the areas of structure indicates that it was a community building, used probably as a warehouse or a marketplace (Rao, 1991). The warehouse can be compared with the West Asian (Tepe Yahya) warehouse (Ghosh, 1989). An inscribed steatite seal amulet with seven stylized sheep on one side, and five on the other side was also recovered from the area of this structure.

The artefacts (steatite seal) and characteristic structure (ware house/market) adjacent to the river bank in Prabhasa Patan-

Somnath holds a mirror to our ancient maritime activity. As the area has been extensively excavated, the interpretation of the structure is more or less unambiguous. Keeping these facts in mind it appears that, the settlement dating to Late-Harappans in this region, probably belonged to overseas traders. The location of the site on the river bank might be suggestive of a safe port area protected from strong open ocean waves.

Underwater Explorations Off Somnath Temple

On the basis of literature and onshore finding, the offshore explorations were undertaken about 300 m towards the south-west of Somnath temple (fig. 11). Diving operations were also conducted at 15 places in 3 zones at the mouth of river Hiranya (Technical Report, 1992). The observations made during offshore explorations are given below.

Observation

The seafloor is rocky and covered with very soft pink and grey colour corals. Three single-holed circular stones were found in a water depth of 4-9 m. The first circular stone (diameter 50 cm) with a hole of 25 cm dia was found partly buried in mud (Buoy 8). Second stone was found about 75 m away from the Buoy 8 towards the shore (Buoy 9). Third one was found in a channel of 2 m deep and marked as buoy no. 10.

Rock-cut Channels

A few channels were observed running in northeast southwest direction. The presence of single-holed stone objects in these channels probably indicates that the channel might have

served as a navigational channel. Nevertheless, the channel indicating a natural origin could not be ruled out.

Single-holed Stone Objects

Five single-holed conical stone objects with convex apex, two buried in the channel and three lying over the rock were noticed during diving exploration (fig. 12). Two objects are of basaltic rock while the rest are of locally available calcareous rock. The maximum height is 65 cm and diameter on the base is 61 cm. These objects were marked with Buoy 9 and 10. The objects at Buoy 9 and 10 are made of basalt and have very smooth surface while others are made of limestone and have very rough surface.

Similar kind of objects which were noticed at Dwarka in deeper waters away from habitational area suggest that these single holed conical objects were probably not used for domestic purposes.

Another suggestion as doorjamb (Rao, 1999) is also not very convincing as they are located away from the habitational sites. Apart from this, there is no such example reported anywhere in Indian protohistoric sites. At Mohenjo-daro they are described as lime stone ring, which have very smooth surface and used either for making pillar or some ritual purposes (Marshal, 1931).

From the preceding evidence it is clear that these conical objects were associated with the navigation rather than domestic, since many stone anchors were also found along with these objects. Most probably these objects served as a base for masts to hold heavy cloth sails. A rectangular single holed object

recovered from Herault river in France (Taylor, 1976) suggests the usage of such heavy, large single holed stone objects as base for the mast. The size of the object probably indicate the size of the boat.

Bhagatrav

This site is located at the mouth of the Kim river, 2 km south of village Jetpur in Hansot taluka of Bhroach district. The mound rising gradually to a height of 15 ft above the surrounding area, extends over 1.5 km from south-west to north-east. Trial-pits laid on the western periphery of the mound revealed 8 ft cultural deposit with a break (IAR, 1957-58:15) holding the Harappan (Period I) and early medieval times (Period II) cultural evolution. Period I is divided into two sub-periods: Period IA is comparable to Lothal and Rangpur IIA. The ceramic assemblage are the carinated dish with projected rim, beaker, dish-on-stand, bowl with short handle, basin, convex-sided bowl and thick storage jar with splayed rim (Rao, 1985:585). Two fragments of chert blades and one faience and two carnelian beads were also found. The eroded surface of the mound and accumulation of sand and silt deposit suggest that settlement was destroyed by a flood (Rao, 1988a:89).

Period IB belongs to a late Harappan phase yielded dish with short projected rim and small jar with slightly elongated neck. Bhagatrav seems to have been a port having contacts with the Harappan sites in Saurashtra.

Mehgam

Mehgam is located close to Bhroach on the Narmada estuary (IAR, 1957-58). A trial excavation yielded dish-on-stand, jar with short neck, dish with slightly carinated shoulder, basin and convex-sided bowl. Rao (1970: 83-108) believes that Bhrgutirth or modern Bhroach was originally situated at Mehgam and was destroyed by the sea forcing the inhabitants to build a new settlement near modern Bhroach. The excavator also feels that Mehgam situated very near the sea has a better claim for being identified as Bhrgukaccha since archaeological remains datable to 1900-1600 BC have been found at the site (IAR, 1960-61; 1961-62). The artefacts recovered from this area and its location on the sea shore indicate that Mehgam had served as a small port which carried out trade during Late-Harappan period.

Malvan

The site is located south of river Tapti and very near to the sea shore. The excavation in 1969 (Allchin and Joshi, 1995) yielded two cultural periods represented by a 1.3 m thick occupational strata with a break in between.

The period I belongs to the Late to Post Harappan culture and period II early medieval time. The important structural remains of period I included a ditch of over 18 m long 1.5 m wide with average depth of 1.1 m cut into the natural soil, running in the east west direction was traced. Its walls were found to be inclined at an angle of 30, and gradually widen towards the eastern side. The spoil from its original dig seems to have been spread over on both the sides of the ditch. On the northern side, however, it was found banked up to form a part of a mud brick structure. To the

south of the ditch, a number of post-holes at 2-8 m interval, dug into the heaped spoil, apparently to provide some sort of a fence, were found. From the filling of the ditch proper a large quantity of cattle bones were obtained.

Several small trenches were laid across the kidney-shaped inlet towards the main channel connecting it with Tapti estuary. These trenches revealed alternate deposits of tidal sand and mud, and yielded both fresh water and marine shells, cores, flakes and potsherd at varying depths. From a preliminary study of this material, it is clear that at high tide, water came up to within a short distance of the bank on which the settlement was located, thus confirming the view that the inlet could have been used as a harbour.

A few late Harappan sites are needed to mention here as their locations are interesting as they might have served as ports in ancient period.

Telod

It is a low lying mound found on the southern bank of the Narmada opposite to Mehgam, where shallow basin, thick storage jar and dish with expanded rim were noticed (IAR, 1957-58). Rao (1962:190) interpreted that Telod must have been a Late Harappan settlement contemporary with Rangpur IB in which the perforated jar, goblet and beaker had ceased to be in use but other Harappan types such as the dish-on-stand, dish storage jar, basin and bowl were still popular.

Hasanpur

This site lies about 2 km east of Bhatgaon in Olpad taluka of Surat district (IAR, 1957-58). It yielded the Lustrous-red-ware and black and red ware comparable to Rangpur IIC and III. The dish with beaded rim, bowl with a sharp- carinated shoulder, high-necked jar and dish-on-stand are the main types noticed here. The site must have served as a small port or fishing centre (Rao, 1962:190).

Chavaneshwari

The site is located on the river Narmada in Bhroach district (IAR, 1966-67:8-9). It is located in an eroded rain gully, near to an extensive early historical mound. The ceramic assemblage had affinities with Rangpur IIB and IIC, black and red ware, including dishes, dish-on-stand and high necked jar along with coarse gritty ware.

Jokha

The site is located on the left bank of the river Tapti. The site measures about 150 X 100 m and rises to a height of barely 2 m from the surrounding fields of black cotton soil. The excavation revealed three main cultural periods.

Period I was marked by the occurrence of typical Chalcolithic pottery including the late Harappan, Malwa and Jorwe wares. Besides, a few etched beads, a fragment of a copper celt, microlithic cores, flakes, beads, lunates, triangles and trapezes and terracotta objects were also obtained. The most interesting finding from this site was a Neolithic celt.

Inamgaon

The most extensively excavated Chalcolithic site in Maharashtra has brought to light a landing platform built on the slope towards the river reaching right up to the river bed. The structure is 9.8 m long and 4.5 m wide. Dhavalikar (1988:248) opines that the structure might have been still larger but due to successive annual floods, got destroyed and reduced in its size. However, available records are enough to suggest that the structure might have served as a landing platform for boats for descending and ascending to and from the river. It is relevant to mention here that small boats with high pro and stern and with oars have been depicted on spouted vessels recovered from the burial sites. These paintings stand in support of river navigation in this area.

Soon after 1400 BC Indus civilization completely lost its identity and apparently got diffused into local cultures such as Ochre coloured pottery (OCP) culture and Painted Grey Ware (PGW) culture in north India and Chalcolithic cultures in central India and Deccan. Therefore, the archaeological evidences on maritime tradition up to 6th century BC are almost absent in the Indian subcontinent. From 1400 BC to 600 BC, the cultural records available in the Indian subcontinent belong to a retrograde culture depicting absence of improvements over the previous Harappan traditions. Thus a time span of ~800 years in Gujarat may be considered as "lost paradise" until new enriched evidences to link-up the proto-history with history are available.

Late Harappan sites on the coastal areas in Gujarat within a distance of 20 km from the shore. The ancient shoreline is taken into account such as the both the Ranns are considered as the ancient shoreline.

Sr. Sites	Taluka	District	Reference
01. Ali Bada	Jamnagar	Jamnagar	Lothal, 701
02. Bed	-do-	-do-	-do-
03. Bet Dwarka	Okhamandal	-do-	-do-
04. Bhagatrav	Hansot	Surat	IAR-1966-67
05. Binanagari	Jodiya	Jamnagar	Lothal, 701
06. Bolera	-	Mehsana	-do-
07. Chanderwara	-	Jamnagar	-do-
08. Chhabasar	Dholka	Ahmedabad	IAR-1976-77
09. Dantisana	-	Mehsana	Lothal, 702
10. Dhanora	-	-do-	-do-
11. Dhulkot	-	Jamnagar	-do-, 701
12. Eravada	Dasada	Surendranagar	IAR-1982-83
13. Ghadwadi wadi	-	Kachchh	Lothal, 701
14. Hariana	Jodiya	Jamnagar	-do-, 700
15. Jaidak	-do-	-do-	-do-, 701
16. Kataras	Rapar	Kachchh	
17. Kerisma-no-Timbo	Khera	-do-, 702	
18. Khakhra Dera	Kanthakot	Kachchh	IAR-1960-61

Sr. Sites	Taluka	District	Reference
19. Khandia		Mehsana	Lothal, 702
20. Khedoi	Anjar	Kachchh	IAR-1976-77
21. Luna Mandvi	Mandvi	Kachchh	
22. Mora	Jamnagar	Jamnagar	Lothal, 701
23. Morpur	Khambhaliya	-do-	-do-
24. Novagam	-	Surat	Lothal, 700
25. Panva		Mehsana	-do-, 703
26. Phala	Jamnagar	Jamnagar	IAR-1980-81
27. Pitar	Jodiya	Jamnagar	Lothal, 701
28. Sai-no-Tikra	-	Khera	-do-
29. Selari	Rapar	Kachchh	IAR-1967-68
30. Sushiya		Mehsana	Lothal, 703
31. Tankaria		Jamnagar	-do-, 701
32. Telod	Hansot	Bhroach	IAR-1966-67
33. Vada	Nakhatrana	Kachchh	IAR-1967-68
34. Wasai		Jamnagar	Lothal, 701
35. Zekhadra	Santalpur	Banaskantha	IAR-1977-78

MARITIME TRADE RELATIONS

Before the discovery of Harappa and Mohenjo-daro Lardner (1830:9) had speculated that the Indian sub-continent did have indirect maritime trade relations with the Phoenician civilization datable to 1200 BC onwards. Though there were no archaeological facts to ascertain it, yet it became true when even earlier civilization discovered in Indian subcontinent were known to have maritime relations with Western civilizations. Now it is well established that Indus-Saraswati civilization (2600 BC to 1750 BC) had extensive trade relations not only by land route but also by coastal navigation as several Harappan ports existed along the Gujarat and Makran coasts (fig. 13). It appears that major part of hinterland trade was also carried out by river navigation as the famous river Indus and Saraswati were navigable during those days. Rigveda quite clearly mentions about river navigation. Kautilya in his Arthashastra (Kangle, 1972:45) mentions that transportation by river route was much easier, faster and cheaper compared to the land transportation.

Relations With Mesopotamia

The ships from Meluhha,
the ships from Magan,
the ships from Dilmun
he made tie up alongside
the quay of Agade

Mesopotamian king Sargon the Great was quoted to boast that boats of Dilmun, Magan and Meluhha lay anchored at the docks of Agade which was his capital (Kramer, 1964:52).

Soon after Marshall's article in Illustrated, London News (20 Sept, 1924:528-532 and 548) Gadd and Smith (4 Oct, 1924:614) in the same Magazine did declare the links between Indus and Babylonian civilization. They compared several objects such as seals from Harappa, which appear to be similar in shape to Susa and on Babylonian sites of the early period. They further added that "the people who made these seals must have been in close contact with Sumerian civilization and have borrowed their artistic style and the basis of their writing".

In the beginning there were several scholars who believed that Sumerian came from Indus Valley region. Hall (1913:173-174), Crowley (1946:267), Pirenne (1951:11) and Heras (1953:186) were among those who proposed the above idea. But later, discoveries and studies have demonstrated that Indus had trade contacts with Mesopotamia around 2600 to 2100 BC. Moreover, the evidence of relations between Indus and Mesopotamia comes mostly from Akkad period (last quarter of 3rd millennium BC), therefore, it is unrelated to the fact the migration from East to West by Indus people.

It is generally believed that the Sumerians were the seafaring people who navigated in the waters of the Gulf (Toynbee, 1947:107) and it should also be noted that the ancient Indians were experienced seafarers (Heras, 1953:184). Therefore, it is reasonable to believe intercivilization trade contacts between Mesopotamia and Indus. As per archaeological aspects are concerned it was accepted in 1933 that the Indus Valley civilization was in contact with Mesopotamia (Frankfort, 1933:48) during Akkadian period in the middle of third millennium BC. Several Mesopotamian tablets mention about the existence of Meluhha colonies in their territory. Majority of the scholars believe that Meluhha of Sumerian text was nothing but the Indus region and Dilmun was the present Bahrain island. On the contrary Kramer (1964) refers to Dilmun as the place of sun rises. In other words, his reference of Dilmun as place of the rising Sun must place this island to be east of Sumer. Further he adds "it is hardly to believe that the island of Bahrain, hugging the Arabian coast, would be conceived by the Sumerians as lying east of their own land". But Luckenbill (1926:70) and Cornwall (1944:99) mentioned that a familiar Assyrian name for the Persian Gulf was "the sea of the rising sun". Now, it is widely accepted that Dilmun was representing present Bahrain island and Meluhha was representing Indus region. Meluhha was a land of seafarers, its boats were mentioned by the king of Akkad Sargon. An Akkad period text refers to "a ... man of the Meluhha ship" (Leemans, 1968:220-1). Timber, Gold, ivory and carnelian were all known to have enjoyed the status of prized products from India in the historical period. All these materials as well as lapis lazuli were utilized by the Harappans. Thus, it appears that the most favourable identification of Meluhha is Western India. Direct trade contact between Indus and Mesopotamia is evident by the presence of seals (Gadd, 1932:3-22), etched carnelian beads

(Dishit, 1949), terracotta statues and dice (Dales, 1968b:14-23) in Mesopotamia. The presence of perforated knobbed and reserved slip ware (Delougaz, 1952), spiral and animal headed pins (Piggott, 1948:28-40) and segmented beads support the evidence of Mesopotamian goods in the Indus. But one point should be taken into account that no Mesopotamian seals, sealings or text are ever found in Harappan sites (Lamberg-Karlovsky, 1972:23-24). This crucial factor is yet to be explained satisfactorily.

The circular seals with Indus motifs or script or both were found in the Sumerian port of Ur and in the intermediate harbours on the island of Bahrain and Failaka in the Persian Gulf. Similarly, the discovery of a Bahrainian type circular seal and terracotta figures of bearded Sumerian and Mummy at Lothal (Rao, 1973) suggest a flourishing overseas trade between Lothal and the ports on the Arabian coast and Persian Gulf. In due course of time, the Indus merchants appear to have established colonies in Ur, Brak, Kish, Arpachiya, Susa and Hissar where Indus goods and trade related items were discovered in excavations.

Indus Seals Found in Mesopotamian Region Ur

1. Unstratified (Wolley, 1928:26) and is made of grey steatite. Reverse is shaped into a ridge perforated lengthwise which form a characteristic of the Indus style.
2. Broken circular stamp seal found in 1928-9. The material is light, flaky steatite of the Indus seals with the highly glazed white surface. The style and inscription is of Indus product (Gadd, 1932:3-4)

3. Half broken stamp seal of the button shape with an Indus sign. The material is a greenish-grey steatite (Gadd, 1932:3-4).
4. A fragment of a seal similar to the earlier example having an Indus inscription of which the fish sign is preserved.

Tell Asmar

1. Cylindrical seal depicting elephant, rhinoceros and crocodile from an Akkadian period house along with a few Harappan objects (Frankfort, 1933:51). The material is glazed grey steatite.

2. Another alabaster square stamp seal with a pierced cylindrical knob on the back. It bears concentric squares as the design from an Akkadian context (Frankfort, 1933:52).

Kish

1. Square steatite seal with unicorn and Indus signs found in a trench 9 meters below the surface (Langdon, 1931:593).
2. Square inscribed Indus seal with unicorn, below the pavement of Samsuiluna, son of Hammurabi (Longdon, 1931:593).
3. One seal found from unknown context one seal, an impressed square clay sealing with at least ten Indus signs (Scheil, 1925:55-6).

Lagash

A seal was reported from Lagash by Sarzec and Heuzey (1884-1912) and later it was mentioned by Delaporte (1920). This is round with button boss (perforated and with two incisions across) bearing an Indus bull with lowered head and five pictographs made on a soft grey greenish stone.

Another rectangular seal in the context of the Larsa period was reported from Lagash by Genouillac. Seal bears only two signs of the Indus script (Genouillac, 1936).

A few other seals of Indus affinity found elsewhere in Mesopotamia included one from Tepe Gwara (Speiser, 1935). In 1977 Gibson reported an Indus seal from the Kassite level at Nippur.

An unpublished Indus seal by Brunswig, Parpola and Potts was mentioned in 1984, and now it is in the Baghdad museum.

Rao has discussed (1968:35-37) the trade relation between Lothal and Susa. Lothal A dated to 2450 BC to 1900 BC representing the mature phase of Harappans is compared with early level of Susa II contemporary with Early Dynastic Sumer while the late levels extend into the Akkadian period. Archaeological evidences in the form of a Persian Gulf Seal (Rao, 1963), the reserved slip ware and other antiquities to prove that Lothal had a flourishing sea borne trade with the west in the Sargonid period (Rao, 1968:35-36). Lothal, Mohenjo-daro and Harappa have yielded bun-shaped ingots of copper similar in shape and size reported from Susa. The Persian highlands and the Oman were important sources of copper in the third and second millennia BC. The identity in shape and size of the ingots found at Lothal, Mohenjo-daro, Bahrain island and Susa may suggest a common source but the impurities present in them vary. Rao further adds, that they appear to have been a common channel of trade. There are other items which were very much similar in both places. Comparative studies of pottery of Indus Valley, Elam and Sumer was made by Joseph (1944:7-17) and he concluded that Indus pottery was very similar to that found in the context of Susa II and

of Jemdet Nasr. The similarities between the knob pots of Mohenjo-daro and Sumer have been emphasized by Frankfort (1933:48-51).

Here it is interesting to note that a few Sumerian seals adopted Indus style with respect to carvings. For example seal from Jemdet-Nasr bears several unicorn (Pl. 18) and another seal from Akkad bears Indus type humped bull with big horns. Joseph (1944:10-11) says that the humped bull existed in Sumer, it must have been brought from Indus Valley region. The humped bull is purely an Indian animal.

Trade contact with Mesopotamia had reached a peak in the later part of third millennium BC, when Sargon of Agade proudly proclaimed that ships from Meluhha, Makkan and Dilmun were moored in the harbour which was situated outside his capital, obviously proving the existence of flourishing commercial relations with east (Legrain, 1923:208).

About the trade contact with Ur, Oppenheim (1954:7-14) says that Ur had direct contact with Magan and Meluhha, but the contact was lost with Meluhha in 2100 BC and with Magan in 1900 BC. Dilmun which had replaced Ur by monopolising trade with the eastern countries itself lost contact with the copper mining centre in Magan by 1700 BC.

The segmented beads in faience and number of these having various length have been reported in Sumer, at Ur and copies of them found in gold. On stone similar beads unearthed in Badarian settlement in Egypt (Brunton and Caton-Thompson, 1928). At Tepe Hissar a number of segmented beads in faience were found in a grave dated to period III (Schmidt, 1933:490).

Now it is widely accepted that seals of Mesopotamia and Gulf origin are very rare in Harappan civilization. A few which can be mentioned here include; a seal from Harappa, bearing the motifs of a splayed eagle. A bronze eagle with spread wings found at Brak which is dated to 2100 BC (Mallowan, 1947:171) may be compared with this figure. A few seals from Tell Brak and Ur bear the symbol of swastika, similar as Indus (Rao, 1979:231). A few seals from Alisar and Sialk (Ghirshman, 1938) bear the swastika symbol too.

The most important finding from Chanhudaro was copper and bronze pins. The common type was made by thinning out one end of a copper rod and then coiling it downwards to form a head. Only one example so far recovered from Mohenjo-daro. Another type is double spiral pin which is only one example recently came from Manda the northern most Harappan site (Joshi and Madhubala, 1982:187). The occurrence of this type of pins reported from Bronze Age Germany and Bulgaria (Ebert, 1932), in Pre dynastic Egypt (Petrie and Quibell, 1896) and in Mesopotamia (Woolley, 1934:310). The double spiral pins are reported from Anau (Pumpelly, 1904:152) and few from Tepe Hissar in West Persia, all dated to Hissar II period (Schmidt, 1933). However, this type of pins are unknown in Mesopotamia.

There are several broken pots with triangular holes at Mohenjo-daro and Chanhudaro. The complete shape is unknown. But similar ornamentation have been noted from Kish and other Sumerian sites. It was reported from Egypt as well as Susa.

A few Harappan pottery bearing the painting of comb and similar type has also been reported from Halaf from Northern

Mesopotamia (Mallowan and Rose, 1935). Comb is also painted on an early bowl from Susa (Morgan, 1927).

Rao (1973:117) believes that Indus merchants sent their ships to ports in the Persian Gulf and beyond. Further he mentions that excavations at Ras Shamra yielded ivory rods which may be of the Indus workmanship reached as far as the north of Syrian coast. Rao also believes that the Indus merchant colonies were in Bahrain islands, the Euphrates-Tigris valley and the Diyala region as evident by the presence of seals with Indus script at Ras-al-Qala, Ur, Kish, Asmar and the Diyala sites.

Rao (1985:477) thinks that the bald head, sunken eyes, sharp pointed nose and prominent square-cut beard of terracotta head from Lothal is of Sumerian origin.

It appears relevant here to discuss about the presence of Sumerians in Indus region. In this context, During Casper (1984:363-70) has emphasized that an unbiased study of a rather large group of what may be loosely termed as sealing amulets reported from the old excavations as Harappa, Mohenjo-daro and Chanhu-daro, appears to show definite non-Indus characteristics. This perhaps calls for a reappraisal of the cylinder seals from Mohenjo-daro and Kalibangan. Further she adds, Chanhu-daro to be the first city to show abundant evidence for Sumerian residents or their descendants. In fact, the same would hold for Lothal (I-IVA). This commercial centre, however, does not provide any evidence either of what we deduce as having happened at Harappa and Mohenjo-daro. Yet Lothal like Chanhu-daro was apparently a centre for the manufacture of the etched carnelian beads. We therefore can conclude that the more southerly situated urban centres like Chanhu-daro, Surkotada IA and Lothal, which

one would have visualized as being eminently favourable for the settlement of Sumerian immigrants, Indianized Sumerians or their Indo-Sumerian descendants, neither show in their material culture a distinguishable foreign component nor provide any assistance for better understanding of the clearly visible West Asian traits witnessed at Mohenjo-daro, Harappa and Kalibangan.

But, still it is very difficult to assume the presence of the Sumerians in Indus region. So far the studies related to Indo-Sumerian relation are concerned, there is no mention of ships proceeding to the Meluhha, whereas there are records about the anchoring of Meluhha boats in their harbour. In the same paper During Casper further adds, that the lack of textual evidence about the Mesopotamians sailing to the Indus area, does not militate against the possibility that by the time the commercial liaisons between East and West were fully concentrated on the sea-borne trade through the Arabian Gulf, the Meluhhans themselves had taken the initiative and monopolized their own end of these business transactions. In this regard it should be mentioned that, if Mesopotamians were in the Indus region then they must have left some material evidences or must have influenced at least the writing system of Indus people providing some type of clue for the archaeologist. In absence of such evidence it becomes difficult to establish the contacts between Mesopotamia and Indus civilization.

Ratnagar (1994:116) has mentioned about a rectangular silver piece from Mohenjo-daro, on which Kosambi (1941/1981) noticed cuneiform writing. But she remarks, "as copied by Kosambi the cuneiform signs are not complete; in fact if the copying is accurate then the sign on the obverse, with one wedge in the wrong position vis-a-vis the long stroke, is a fake".

Gulf Region

Geographical studies indicate the availability of sheltered harbours and resources in the Gulf. From the beginning of the last decade several explorations were conducted in Oman, Bahrain, Saudi Arabia and other Gulf countries, which have proved the maritime trade relations with Indus Civilization. Several new evidences are emerging in these countries as a result of new studies. Recent discoveries from Gulf countries like Oman, U.A.E. and Bahrain island throw sufficient light on 3rd millennium trade contact with India.

Oman

The Recent research in Oman peninsula has provided sufficient data on the relations between Oman and Indus region during the 3rd millennium BC. A Jar of black-on-red ware bearing a painting of an elongated humped bull was found from cairn V at Umm-an-Nar (Thordvilsen, 1964:219) and was dated to the mid third millennium BC (Cleuziou, 1989:69) and is similar to those found in Indus Valley region. The most probable link is the presence of Black-on-Grey painted jars and incised Grey ware in contexts dated to the second of the 3rd millennium BC (de Cardi, 1968:135-55). Several sherds of large red ware jars with an inner lack coating had been discovered in the period III layers at Hili 8. The ware being similar to the Indus type and different from the local ware was already considered an import (Cleuziou, 1981:291). A rim sherd from Hili (Cleuziou, 1984:4) appears to belong to a well-known Mature Indus type (Dales and Kenoyer, 1986:83-84). Other evidence include a sherd of a dish-on-stand with concentric rows of thumb-nail impression found in unit 67, period III (Dales and Kenoyer, 1986:291). With above findings Cleuziou (1992:94) says

that by the end of 3rd millennium BC a set of technical innovations of Indus origin had made their way through the Oman peninsula. Another important site of Indus relation at Maysar yielded similar collections including cord impressions (Weisgerer, 1984:199), thumb-nail impressions, Harappan like signs engraved on the rims of jars and a prismatic seal of possible Indus tradition engraved with animals (caprids, cattle, a crocodile or a scorpion) of clay (During Casper, 1983). The Maysar assemblage is dated to the late 3rd millennium BC by its excavator. In 1981 the discovery of a sherd with four engraved Harappan signs at Ra's al-Junayz (Tosi, 1983) confirms the hunting of Indus relations in the Oman peninsula.

A small jar painted all over with black-on-red decoration of peacocks and geometric patterns was found on a floor of room VI in building I of period II At Ra's al-Junayz (Mery, 1988). This find is similar to Lothal A (Rao, 1973:96) and Harappa. Along with this jar a small square stamp seal of copper bearing a classical Harappan pattern—that of a unicorn in front of a stand under three signs of Harappan script (Cleuziou and Tosi, 1990). The seal is from period II context and can be dated to 2400-2200 BC. Several sherds of large jars in red micaceous ware with black painted naturalistic decoration similar to Mohenjo-daro (Marshall, 1931:313-14) or Harappa (Dales & Kenoyer, 1986:78-81) have been found at Ra's al-Hadd H.D. I, which belong to the mature Harappan phase (Cleuziou, 1992:96).

Cleuziou (1992:97) has mentioned an ivory comb from Ra's al-Junayz which was found in the earliest occupation layer of store-room II in building I (period II). Cleuziou has compared this comb with those found at Mohenjo-daro (Mackay, 1938:542) and Chanhudaro (Mackay, 1943) and therefore he considers it as an

import item from Indus region. A potsherd inscribed with five Indus signs found on the surface in association with Wadi Suq painted pottery (Cleuziou and Tosi, 1989: 15-47). In this connection Tosi (1974:145-71) thinks that the Indus people made a kind of base in Oman for further voyage up to the Egyptian coast. About the location of Ras-al-Junayaz where an inscription with four Indus characters was found incised on the shoulder of a painted jar, he writes "this locality occupies an even more strategic position on the coastal routes from Karachi to the Horn of Africa". Further he adds, it seems increasingly likely that the Indus civilization contributed more to oceanic sea-craft than any of the other proto-urban civilizations of the middle-east.

The discovery of well-fired micaceous red ware, red ware with thick dark brown to black slip on exterior from several sites in Oman, clearly demonstrates the import of such pottery in the Oman peninsula (Mery, 1991:240-57). As per 14C dates it ranges between 2450 and 2200 BC. On this chronological basis the presence of Indus wares in the interior of Oman begins around 2500 BC and continues during the whole of second half of the 3rd millennium BC (Cleuziou, 1992:95).

At Tell Abra, two stone weights (14.2 g and 53.95 g), inscribed potsherds and the everted rim of an orange jar with black painted horizontal bands have also been considered as Harappan origin (Potts, 1990:61).

Frifelt (1975:368) mentioned a small black-on-red painted bottle, may be of Harappan influence from tomb 1059 at Hili. The object is dated to end of 3rd millennium BC. Further she recorded an Indus influence seen on a faience segmented bead from a tomb dating to the 3rd millennium BC from Wadi Suq valley.

Fine red ware with black painted decoration combining geometric floral and zoomorphic designs was found in tomb A at Hili north, most of these clearly relate to the common Indus valley patterns (Cleuziou and Vogt, 1985: 264-266). As far as pottery is concerned, it now appears that the most possible among the imported Indus wares in Oman, the dark coated jars, made its appearance between 2500 and 2100 BC (Cleuziou, 1992:97).

During the excavation at Maysar a prismatic stamp seal engraved with animals (caprids, cattle, a crocodile or a scorpion?) was found which shows similarities with Harappan clay amulets (During-Caspers, 1983, Weisgerber, 1984). Potts (1990:112) suggests the possibility of comparisons with Crete, Syria, Egypt or even Central Asia. Weisgerber (1984) however takes into account as a similar object found in grave 1 at al-Hajjar in Bahrain, which suggests a typical Indus bull on one face and three signs of the Indus script on the other. The most outstanding discovery however, was made in room VI building I at Ra's al Junayz in association with the smashed painted jar (Cleuziou and Tosi, 1990). It is a small (2.2 X 2.4 cm) square stamp seal of copper, completely corroded, which on computer enhanced X-ray examination revealed a figure of an unicorn in front of a stand under three signs of the Indus script. A similar silver object depicting an unicorn was found at Mohenjo-daro in block 9, house XII (Mackay, 1938). Another seal of copper, also with a unicorn was found at Lothal (Rao, 1973:94). The seal at Ra's al-Junayz is from a period II context and can therefore be dated around 2400-2200 BC. About the date of Oman-Indus relation Cleuziou (1992:98) mentions that "Indications of Omani contact with the Harappan world can be traced for every period from the first part of the 3rd millennium BC (Early Harappan), through the second part

of the 3rd millennium (Mature Harappa) where they are numerous, and during the early 2nd millennium (Late Harappan) BC".

Bahrain

The archaeological finds about the overseas trade with Bahrain Island came from the excavations at Lothal in the form of circular steatite seal (Pl. 3). It has two symmetrically disposed animals of the ibex family flanking a double headed dragon, while other side, a low boss perforated across a triple line. Rao (1963:99) called it as "Persian Gulf Seal".

Another important evidence on trade relations with Bahrain came from Bet Dwarka on Gujarat coast, where a seal of Chank shell was found in 1986 in intertidal zone. A three-headed animal motif representing a short-horned bull, a unicorn and a goat is engraved on it. The seal and motif suggests Indus origin but the art style seems to be of Bahrain art (Rao, 1990:89). The exaggerated eye of the animals and the outline drawing of the bull are characteristic of animal figures on the round seals of Bahrain. Three-headed animal figures are also engraved in a few seals of Mohenjo-daro, but the art style of the Bet Dwarka seal and the late Harappan pottery from the intertidal zone of the island suggest a trade relation between Bet Dwarka and Bahrain during the second millennium BC.

Danish expedition has unearthed a large number of circular steatite seals in the excavation at Ras-al-Qala and Failaka (Glob and Bibby, 1960). It seems that Indus merchants had established their colonies at Failaka, Ras-al-Qala, Ur, Kish, Brak, Asmar and Arpachiya, as a number of Indus type seals were collected from these sites.

A few sherds of painted pottery with designs in black or red on a buff background found at Ras-al-Qala, appeared to show a connection with the Indus civilization (Chakrabarti, 1990:13). The significant evidences were of 7 stone weights found in a building of the second or Barbar phase of the city. Bibby (1970) remarks on these weights, "both in shape and in weight, they are similar to those found in the Harappan civilization. It is difficult to avoid the conclusion that the use of this weight system in Bahrain must point either to the first mercantile contacts with Bahrain having come from the Indus valley, or to the Harappan culture having been the most important commercial links of the merchants of Bahrain more important than their Mesopotamian customers". In the Barbar temple complex a few perforated stones have been compared to "ring-stones belonging to the Indus civilization" (Chakrabarti, 1990:14).

There are other sites in the Arabian Gulf where Harappan pottery and seals were found. A few polychrome sherds found at Qala'at-al Bahrain suggest the early Harappan contact with Bahrain island. Two round stamp seals with Indus Script found in the North wall trench in Qala'at-al Bahrain (Larsen, 1983:234).

Excavations by Danish expedition at Sa'ad wa-Sa'aid in Failaka island, two round stamp seals with Indus Script have been found (Kjaerum, 1983:). One was picked from unstratified context may be of the oldest Dilmun dated to Failaka Period 1 or 2 and other was found in a Period 4A (Hojlund, 1985:49). Hojlund says about the dating of Harappan material in Gulf that "the majority of Harappan material in the Upper Arabian Gulf may be dated to Qala'a II A, B and C which is perhaps contemporary with the Mesopotamian late Akkadian, Ur III an Isin-Larsa period. Now here archaeological finds suggest that Harappan trading actively

continued in Arabian Gulf and Mesopotamia in the Ur III period and even later" (Hojlund, 1985:49).

The Harappan artefacts appear in the fields in late Qala'a I and especially in early Qala'a II. In Qala'a II A, a city wall (Bibby, 1983) and the first temple was built (Anderson, 1983) and the Arabian Gulf seal was created (Bibby, 1983), and Mesopotamian pottery almost disappeared. These are the elements pointing towards the development of an independent Dilmun state. About this new situation of Harappan trade Hojlund (1985:51) says, that "the formation of a local ruling class would lead to a demand for luxury and prestige goods, and this is perhaps how we should interpret the Harappan painted pottery presented here, apart from the ivory and carnelian beads also occurring in Qala'a II. Further he says that the Harappan related finds seem to have disappeared in Bahrain in Late Qala'a II datable to 1800 BC.

In 1985 K.M. Srivastava excavated about 70 burial chambers at Hamad town in Bahrain and he was able to recover a lot of evidence showing trade relations between India and Bahrain. In Chamber no 1757 he found an Indus seal with a charging bull, a peacock and four letters of Indus Script (fig. 14). This is made of soft steatite stone. Srivastava says that "the man whose body was buried in this grave must have been an authorised agent of Indian goods". The findings of carnelian beads also suggest that these items might have been imported from Saurashtra region of India (Khaluj Times, Aug 23, 1985) during Harappan period.

The occurrence of circular seals bearing the Indus script and motif in the Persian Gulf and cylindrical seals bearing

similar motifs and script in the Euphratis-Tigris valley suggest that the Indian merchants who had established their colonies in Mesopotamia and Bahrain used a local type, engraved with either Indus motif or legend or both. These motifs and legends engraved on the circular seals found at Ur are attributable to Indian merchants who had their colonies in the Persian Gulf and traded with the merchants of Ur. Similarly, Sumerian merchants, who had their colonies in Bahrain may have adopted the Sumerian devices on circular seals.

United Arab Emirates

The discovery of Indus related pottery has been reported from tomb 6 at Shimal in United Arab Emirates (de Cardi, 1985:12). This was a high-necked jar with painted groups of dark horizontal thick lines, which is a characteristic feature of pottery from Saurashtra Harappan sites in Gujarat (Manchanda, 1972:148). Another important find from the same site was a cubical weight, made of a cream-and-buff banded chert. It measures 2.25 cm and 2.30 cm and weighs 23.600 gms (de Cardi, 1985:12). Similar type of weights have been found in the mature Harappan phase particularly in Lothal A and Rangpur IIA (Rao, 1979). de Cardi (1985:12) points out that Harappan finds shed light not only on Ras-al-Khaimah external relations but on burial customs of the period. The presence of several grave-goods with the dead, de Cardi (1985) says, that most probably grave belong to a Harappan, together with the weight as a tool of his trade.

Above evidences mostly belong to 2600 BC to 1900 BC which represent the mature phase of Harappan civilization. After 1900 BC a vast area in Gujarat was covered by the Harappans including south of Narmada and Tapti. Excavations at several

coastal sites of late Harappan period suggest that external trade was continued at least up to 15th or 14th century BC with west. This is evident by the presence of Kassite ware in these sites. The study of late Harappan trade is still incomplete in view of predetermined imagination that Indus trade was seized somewhere in 1900 BC. It might be relevant in the case of Mesopotamian region certainly not with Gulf countries.

Egypt

In 1945, Father Heras had argued about the relations between Indus Valley and Egyptian Civilizations. He believed that Indus people had contributed a lot in flourishing of Egyptian civilization. He had given several examples, but now the scientific dates from Indus sites suggest that Egyptian Civilization began 700 years earlier. Therefore, his arguments are unrelated to this fact.

About the religious similarities between Egypt and India Heras mentions that 'An' was worshipped in both countries. The God 'An' is identified with the Sun. 'An', 'Anil' and 'Ama' in India (Heras, 1936:16-18). About the similarities in pottery also Hall (1922:255-57) has mentioned that pottery of both nations shows remarkable similarities not only in its manufacture but also in its colouring and painting.

A few archaeological finds suggest that Indus sailors had reached up to East Africa. The presence of a terracotta model of Gorilla and a mummy at Lothal suggest that they had contacts with the Egyptian Civilization. The 'Sikorimata' a local sea goddess at Lothal is said to have been derived from the name of the island now known as Sakotaro which is off the east coast of Africa

(Rao, 1973:118). Recent discovery by Bhattacharya (1991:53-57) from Rangpur, is a unique seal described as Egyptian in origin. It is circular with 35 mm dia and 4mm thick and engraved on both sides (Pl. 17). There are two perforations along the rim to facilitate the insertion of a string. The one side of the seal is depicted by two bull like animals with four legs each one having a tail and a longish neck, the peculiarity of one of the apis bull of Egyptian origin. There are also coiled snakes extending along the remaining portion. On the other side, a figure of a man sitting in a regal manner with the hood of a the snake above his head is seen. On the basis of the depiction of the apis bull on one side and Egyptian type throne on the other and the snake on both sides, he believes that the Harappans must have trading links with ancient Egypt.

During the Eighteenth Dynasty of Egypt, an intersecting circle pattern on pottery was in use which resembles very closely the Indian examples (Petrie, 1895:47-48). Hare is depicted on Sixth Dynasty Egyptian seals which is very common on Indus pottery. Rayed solar motifs occur on several pot sherds of Chanhu-daro and at other Harappan sites. But at Mohenjo-daro it appears on a seal with a six rayed object with one ray terminating in the head of a horned animal. Similar type of symbol appears on an early steatite seal from Crete (Evans, 1929:218) and also on a few seals of Tell Asmar, Kish (Woolley, 1935: fig.35) Sumerian site and also from Susa (Childe, 1934:243). A double triangular motif was found on the base of a broken jar at Chanhu-daro and the same motif also appears on the seals of Mohenjo-daro, while similar motifs appear in Egyptian pottery where it was used a pot-mark (Petrie, 1939).

Sundara (1990:41) has mentioned a few archaeological remains which suggest contact between the region of the Nile Valley and Karnataka, possibly along the coast in the protohistoric period. A terracotta head rest was found in a stratified Neolithic burial at T. Narsipur (Seshadri, 1971), and also in the stratified Neolithic culture in Hallur (Rao, 1971) are similar to those found from the tomb of Tut-Ankh-Amen Pharaoh of the late 18th dynasty of Egypt datable to circa 1400 BC. These head-rests are made of ivory, lapis-lazuli, blue faience, turquoise and blue glass.

Later Egyptian connections with the Indian coast are also evident from discoveries of several similar type of stone anchors from Indian waters particularly Dwarka and Somnath and east African coast particularly the Red Sea area. A detailed discussion has already been made in the previous chapter. Therefore, it is relevant to predict that Egypt and India continued its trade relations even after the 1500 BC by sea route.

The above discussions clearly indicate that during the 3rd millennium BC, overseas trade was equally important as overland trade. And most of the civilizations probably flourished due to great contributions of overseas trade and commerce. The most important aspect of Bronze Age Civilization was a proper network of trade system which not only increased its prosperity but also helped in controlling the administration.

7

TRADE ITEMS

Now, it has been firmly established that the Indus people had an extensive trade contact with its contemporary civilizations. There are several items which are not available in India but found in these sites and several items of Indian origin found in Mesopotamian and other Gulf countries. Therefore, it is necessary to have a proper account of these trade items. From the preceding chapter it appears quite convincing that Indus civilization had overseas trade with western civilization from the dawn of its establishment in the Indus Valley. In Gujarat, it appears that prior to Harappan settlement there was some kind of migration from Sind to Kachchh via probably river and sea route. As stated earlier that pre-Harappans at Surkotada, Desalpur and Dholavira witnessed the influence of Amri culture. Moreover, it was easy and convenient to move from Sind to Kachchh via river and sea routes than the land route (for which they would have to spend four times more). Gujarat being the land of natural resources like semi-precious stones and conch shell and long coastline with several natural harbours, it was conducive for Harappans to establish their colonies here.

Copper

Sources of Raw Material

In India copper mines have been reported from Rajasthan and Gujarat. The northern most source is Khetri, Babal and Singhana in Jhunjhunu district. Dariba copper mines exist in district Alwar and copper ores exist at Zari, Kalikui, Delwara-Kerovli, Debari and Bansda in Udaipur area. Gordon (1950:62) reported a copper mine at Motaka on the upper Saraswati in southern Patiala region. In Gujarat, copper is available at Abu, Kambaria, Ambamata and Danta in district Banaskantha (Chatterjee, 1963).

Apart from India, Oman was an important source of copper. Ratnagar (1981:89) says "at least one hundred showings of copper mineralization (native copper and oxidic and sulphidic ores) are reported from the Sultanate of Oman today". Several old mining sites are also marked by the occurrence of slag and other debris at the surface. The most important of them appear to be sites in the vicinity of the Wadi al Jizzi. There are several other sources which are believed to be mined by ancient civilizations such as Cyprus, Palestine, Iran, Zagros Valley, Caucasian Armenia (Karajian, 1920:161-8) and Afghanistan regions.

One of the prominent import items mentioned in business documents of Ur is copper from overseas trade. In the Ur III period the Nanna temple handed out quantities of merchandise from its store house to merchants for buying copper from Magan (Ratnagar, 1981:95). Although, Meluhha is nowhere mentioned as a land of mines, copper was obtained by Gudea (Muhly, 1973:306-7) from Meluhha.

Rao (1963) mentions that Gujarat Harappan imported copper which was arsenic-free but copper ingots recovered from Harappa and Mohenjo-daro contain arsenic. Probably, copper was mined from Khetri and Debari in Rajasthan as well copper ores. Arsenic-free copper was found at Susa. Some of the bun-shaped ingots found in Susa D are comparable in weight and size with those from Lothal (Rao, 1965:520), Mohenjo-daro (Mackay, 1938) and Chanhudaro (Mackay, 1943:186). The absence of arsenic in the Lothal ingots suggest Oman as an alternate source of copper where the ore is said to be free from this impurity. Rao (1979:233) thinks that "copper for Lothal must have come from Cyprus or Oman in view of the fact that bun-shaped ingots are found only in Bahrain, Cyprus and Susa".

Double-spiral headed pin from Mohenjo-daro (Mackay, 1938:539), Chanhudaro (Mackay, 1943:195) and from Manda (Joshi and Madhu Bala, 1982:187) and animal headed pins from Harappa (Vats, 1940:390) and one from Mohenjo-daro (Mackay, 1938) were recovered and believed to be imported from the West. Piggott (1948:26-40) has also suggested that these copper pins were imported into the Indus Valley. The presence of these pins at Troy II, Alaca, Huyuk, Brak, Mari and Hissar II, III etc. is the base of Piggott's argument and the eastward migration of this type. Lamberg-Karlovsky (1972:222-230) has strongly criticized the evidence of spiral and animal headed pins as proof for trade between East and West. However, he says that their popularity throughout late 3rd millennium BC in Western Asia was an indication of a common tradition in the manufacture of pins.

It is noteworthy to mention here that spiral pin or animal headed pins were not common in Indus Valley and if one or two were sighted from a few sites then it was most likely that they came through direct or indirect trade. A copper dog and bull-amulet of Susan type were also reported from Lothal (Rao, 1979:233). Other similar objects found in Susa and Lothal and other Harappan sites include barbed fish-hooks, tanged arrow-head, splayed chisels, hollow nail and rivet with flat head may be considered to the exchange of ideas through trade.

Hence, it can be said that there was some kind of copper exchange between Harappan and Mesopotamian Civilization, but it is difficult to say the pattern of exchange. We are not sure whether they imported some copper from Susa as suggested by Rao or whether the Harappans exported copper as evidenced by the Sumerian text.

Tin was generally used as an alloy in copper to make bronze. Muhly (1973:309) mentions that tin came into Mesopotamia from two different sources and routes. The first was an overland route bringing tin into northern Mesopotamia from northwest Iran, and the second was the sea route from Meluhha. But Ratnagar (1981:94) is not convinced by Muhly's arguments that tin came from Meluhha also. However, there is possibility that Harappans handled a transit trade in tin as they are known to have done with lapis lazuli. However, it is important to note that there is no other evidence in trade or literary text to tin from either Meluhha or Dilmun or Magan.

Beads, Seals, and Sealings

Sources of Raw Materials

Agate

Agate and many other varieties of chalcedony occur at several places in Gujarat. The commercial production is reported from Bhroach and Kachchh district. In Bhroach district thick agate bearing conglomerates occur near Ratanpur in the Rajpipla area, and further west between the mouths of Tapti and Narmada rivers. They also occur in the cultivated fields of Amaljar, Maljipur, Damlai, Dholkuva, Vasna, etc. and in western parts of former Rajpipla area. These stones are worked into beads, bowls, knife-handles and other objects of art at Cambay. The conglomerates in which the agates occur cover an area of 4.35 square km and are of Tertiary age. Other places where they occur are Veratia in Jamnagar district, Latipur, Jiwapur, Badanpur, Khakhra, Lakhana, Badi and Chaya, Khamba in Bhavnagar and Hemal Shohra in Junagarh.

Steatite

One of the most common raw material extensively used by the Harappans. The objects made of steatite include seals, sealings and beads. The main sources of steatite are Devni, Mori and Kundol in Sabarkantha district (Rajyagor, 1974:18). Here steatite is soft, homogeneous in texture and occurs in bulk. Steatite deposit is also reported from Lokhan and Mora in North Gujarat (Rao, 1985:583). Low grade steatite also occurs in the Panchmahal district (Patel, 1972:16).

Faience

It is a synthetic product being calcified quartz formed by the mixing of lime with quartz at a very high temperature. The glaze frequently noticed on the surface of faience object is used to silica, a natural mineral ingredient of quartz. Segmented beads strictly confined to faience are of particular interest as they provide collateral evidence for dating and cultural contact between Lothal and western Asiatic sites such as Ur (Rao, 1985:583). Childe (1958:139) suggests that this type is an important link between the main centres of the Indus Valley and Mesopotamian civilizations.

Chert

Chert was mostly used for making flake blades and weights. Working on chert have been reported from Lothal (Rao, 1979:85), Desalpur (Joshi, 1972:105) and Kerasi (Joshi, 1972:108). The chert is reported from Lakhanka and Rampur in Bhavnagar district (Trivedi, 1969:20-1) and also large quantity of chert is found in Kheda district (Rajyagor, 1977:20-1)

Beads

Beads are the one of the most important items which have been reported from several sites of Mesopotamia. In Mesopotamia different types of Indian origin beads have been found. Therefore, it is necessary to have a detailed discussion on this item.

There are several types of decorated carnelian beads from Mohenjo-daro (Marshall, 1931:146) and Lothal (Rao,

1985:600) resembling a bead found at Kish (Mackay, 1929). A few tablets from Ur also mention gemstones and beads being imported into Ur from Dilmun, Makkan and Meluhha (Rao, 1979:234). Rao has suggested that Lothal was exporting beads and gemstones to the Euphratis-Tigris valley in the 3rd and 2nd millennium BC. For example, barrel-shaped beads with a lenticular section, characteristic of the Indus civilization are found at Susa, Asmar, Kish and Ur (Rao, 1979:234). A large number of beads have been found from several Harappan sites in Gujarat including Lothal, Dholavira, Kuntasi and others. Outside of the Indus Valley and Saurashtra, etched carnelian beads are found in Susa D (Rao, 1979), early graves of the pre-Sargonic periods at Ur (Woolley, 1934:366), Hissar III C (Schmidt, 1933:223), Cemetery A at Kish (Mackay, 1931:459-51) and the Akkadian levels of Asmar (Frankfort, 1933:51). Rao (1979:235) believes that these evidences suggest that Lothal and other Indus cities were the main source of supply of gemstones and steatite beads to Mesopotamia.

Long barrel-cylindrical beads are mostly made on carnelian and a few on terracotta, plasma or green chalcedony lapis lazuli and agate (Chakrabarti, 1982:265-70). Mackay (1931:459-73) opines that similar type of beads have been found at Kish which have been dated to the pre-Sargonic period. The beads of this type occurred rarely in early Mesopotamia while a large number beads have been found at Mohenjo-daro, indicate that these beads were made in India and exported to Mesopotamia (Mackay, 1931:459-73).

Long barrel type beads have been reported from only two Mesopotamian sites: Kish and Ur. At Kish, these beads seem to have been made of carnelian, lapis lazuli and agate (Chakrabarti,

1990:31). Similar type of beads occurs in the Royal Grave at Ur which is dated pre-Sargonic period. About 14 long barrel-cylinder beads are preserved in Haddon Museum and Museum records indicate that they belong to the Akkadian Grave at Ur (Chakrabarti, 1990:32).

A large number of etched carnelian beads are reported from the Mesopotamian site. Julian Reade has prepared a detailed catalogue of the finds of etched carnelian beads of Mesopotamian sites (Reade, 1979). From Ur at least 55 etched carnelian beads were reported which have been dated between 2550 and 2000 BC. From Tell Asmar 7 beads were found in the context of 2350-1800 BC. Three beads from Ashure have been dated to 2000-1900 BC. Nippur excavations yielded two carnelian beads from Ur III level datable to 2100-2000 BC. And a single carnelian etched bead was reported from Abu-Salabikh which has been dated to 2600-2500 BC ED IIIA or ED IIIA/B transition.

Recent excavations at Harappa by Dales and Kenoyer (1989:24) suggest that some of the stone ware bangles were probably made in Mohenjo-daro and carried to Harappa, either intentionally by traders or unintentionally through the movement of people wearing the bangles. Harappa had produced a wide variety of stone beads made from a range of different raw materials. None of these materials are available in the alluvial plains and therefore all of the stone beads represent trade contact with regions where the raw material was available. Dales and Kenoyer (1989:25) say that "as most of these regions were within the domain of the Harappan culture, we assume that their distribution reflects internal trade networks". Some of the raw materials for example carnelian, banded agate and amazonite are seemingly derived from the region of modern Gujarat, India.

Lapis-lazuli was probably obtained from the Chagai Hills region of Baluchistan or the mines near Badakshan in Afghanistan. Various colours of steatite could have been brought from Baluchistan to the west or from the Rajasthan ranges to the east. Variegated jasper and limestone could have been acquired in the Kohistan or Baluchistan region as well as from Rajasthan, Kathiawad, Kachchh or Saurashtra.

Weights

Another important aspect of trade was exchange of weight system. Mostly, Harappan weights were chert cubes with bevelled corners. However, spherical weights with a flattened base and top, barrel-shaped weights and conical pierced weights were also found at the sites of Indus civilization. Ratnagar (1981:185) believes that Harappan weight system was adopted by the Barbar culture and Indus people had also used Mesopotamian weight system. A cubical weight from Shimal in United Arab Emirates suggests a common weight system was adopted in Gulf region.

Seals and Sealings

A detailed discussion has already been made on the findings of Indus seals in Mesopotamia as well as in Gulf countries. However it may be mentioned here that the material used for these seals are mostly, steatite, faience, clay, shell and copper. The raw material for shell seal must have been supplied by the Harappans.

Shell

Gujarat coast particularly Kathiawad and Gulf of Kachchh is produces a large number of conch shell, which was mostly used by the Harappans and Mesopotamian. Shell fishing has also been reported in Makran coast. Besides, shells are not available in Gulf countries (Hornell, 1951:21-27). *Chicorus ramosus* was a commonly used species in Mohenjo-daro, which is now available in significant quantities along the southern shore of the Gulf of Kachchh and occurs less further west along the Sind and the Makran coasts (Kenoyer, 1985:304). A special variety of shell known as chank (Shankh), is one of the most sacred object in Hinduism. Every temple must have chank. A sinistral chank is one of the emblems of Vishnu and such shells are amongst the most important treasures of the great Hindu temples. Biologically, this is called as *Xancus (Turinella) pyrum*. It is a species strictly confined to Indian waters occurring nowhere else in Asia. The find places only in the Gulf of Mannar and on the Kathiawad coast. It prefers a sandy bottom where tube worms abound, for these constitute its chief food. The most prolific beds occur in water depth of 15 to 20 m (Hornell, 1951:24-25). The chank shells were also used to produce bangles in the ancient period. Even today in Bengal these are used to make bangles (Hornell, 1913:407-418).

Several types of shells were used by the Harappans which includes *Turbinella (Xancus) pyrum* L. (shankha), *Murex ramosus* L, *Fasciolaria trapezium*, *Cypraea* sp. (cowrie), *Arabica* (cowrie), *Babylonia spirata* L, *dentalium*, mussel and *Arca granosa* (marine ark). All these species are found in Indian waters. Mostly off Sind, Kachchh and Kathiawad coasts (Hornell, 1951; Marshall, 1931:664-6). As stated earlier conch shells are not found

in Arbaian Gulf. But shells were widely used for inlays, bangles, beads, gamesman, ladles, feeding cups, statuary and other decorative purposes along with steatite and lapis lazuli in Mesopotamia (Ratnagar, 1981:147).

At Mohenjo-daro shell workers quarters have been identified by the presence of shankh-shell and numerous inlay pieces and heads of shell cores (Marshall, 1931:170,219). Lothal was another shell working centre: complete shell cores and finished objects have been found in two workshops (Rao, 1962:22-3). Rangpur was also evidenced as shell-working centre (Rao, 1962:149-55). Nageswar in western Sauashtra was a very active shell working centre. Excavations at Nageswar (Hegde, et.al.: 1990) yielded a large quantity of shell objects.

From the Mesopotamian sites like Kish and Ur shankh shells were found. These had cut on the inside and around the orifices, to serve as ladles or lamps. They are copied by examples at Mohenjo-daro (Mackay, 1938:421-2) and Chanhudaro (Mackay, 1943:231-3) and are clearly imported from India as the Shankh shell is only to be found off the south and west coasts of India and does not occur in the Gulf region (Hornell, 1951:231-3). However, Mesopotamian texts have not referred to the overseas trade of shells.

Pearl

Mesopotamian texts have mentioned about the import of pearls from Larsa (Ratnagar, 1981:138). It is believed that these pearls came from Indus territory. In Sind there was formerly a lucrative oyster industry but the oysters found on the coast of Kachchh and Kathiawad were winnow oysters and not true

pearls. The winnow very rarely produces pearl and they tend to be small and misshapen, thus valued more for medicinal than for ornamental purposes. In this connection one might mention the heap of oyster shells found in a Mohenjo-daro house (Marshall, 1931:197).

Another important evidence of trade is a single bead of mother-of-pearl at Mohenjo-daro and four disc shaped beads of this material at Chanhudaro (Mackay, 1938:585). It has been suggested that this shell came from the Gulf (Ratnagar, 1981:148) as it was not available in Western Indian waters (Jameson, 1901:372). Mother-of-pearl has also been found at Shahr-i-Sokhta IV (Tosi, 1974:164).

Wood

A number of Mesopotamian texts mention about the import of wood from Dilmun, Magan and Meluhha (Ratnagar, 1981:100). Wood was the earliest among other commodities traded by Mesopotamia. A text belonging to ED IIIA of Lagash records the arrival of boat-loads of wood from Dilmun (Sollberger and Kupper, 1971:IC 3, a,b,c). Gudea of Lagash refers to timber coming down from the mountains of Magan and Meluhha and from Dilmun, (Thureau Dangin, 1907:66). In several Ur III texts have mentioned special varieties of wood, imported either from Meluhha or from Magan or Dilmun, and were used for making furniture (Ratnagar, 1981:98). The lexical text HAR. *ra* = *hubullu* specified Dilmun, Magan, Meluhha and other regions as the sources of particular kinds of wood (Leemans, 1960:126, 161). Around 2000 BC Ilushuma from Eshnunna mentioned the making of a throne of Meluhha wood inlaid with lapis lazuli (Leemans, 1960:125-6).

The excavations of Harappan sites yielded a number of species which include teak, deodar and sal. Sanskrit literature and Chinese travelogues suggest that up to medieval period Saurashtra region was thickly forested (Beal, 1906:269). The western ghats have been a valuable source of wood through the ages and this wood was often exported, as the later day historical record Periplus indicates (Schoff, 1912). Mesopotamia might have imported fine woods not only for its prestige purpose such as the building and decoration of temples and temple furniture, but also for functional objects such as carts, wagons, furniture and boats (Ratnagar, 1981:99). Solonen (1939:138) gives a list of species occurring in text as boat building woods. These are *Su-dim-ma*, *isu*, *sa eleppi*, *gusuru*; *asuhu* (fir), *eren* = *erenu* (cedar), *Sarbatu* (Mulberry), *Mes.ma.kan.na* = *Musukannu*; *hus abu*, *qanu* (cane); and *aslu* (rushes).

Teak has always been valued for its use in building boats and has been continuously exported from western India to Gulf. There is a mention of sea wood which was used for constructing buildings and making furniture. Hourani (1951:90-1) believes that teak wood was imported from India to Mesopotamia. The above several references suggest that apart from the carnelian beads, Gujarat was the main exporter of wood during Harappan times.

UET-III:348, 430, 660, 752 and 828 mentions as *ab-ba meluh-ha*, a hard wood from the land of Meluhha. Text no 828 mentions that throne of Suruppak made of *abba* a wood from Meluhha. Meluhha (UET-III:827) is also mentioned as the land of the bamboo reed and the mesu wood. Texts 813 and 814 have stated that *mesu* wood was used for making furniture.

Ivory

It was another important export item of Harappans to Mesopotamia. Ivory items have been found in large quantity at Indus valley sites. For instance, ivory tusk is found at Mohenjodaro (Mackay, 1938:579), Chanhudaro (Mackay, 1943:14), Lothal (Rao, 1962:23) and Surkotada (Joshi, 1972:135). Ivory was used for making containers, combs, kohlsticks, pins, awls, hooks, toggles, gamesmen, buttons, rods, scales, plaques, dice, inlay, furniture, fittings and personal ornaments. In Mesopotamia, ivory was practically unknown from OB to the late Assyrian periods (Leemans, 1968:216; Oppenheim, 1954:11-12) as trade had ceased. Indian ivory had played a vital role in international trade in ancient period. Excavations at Bahrain island yielded a large quantity of ivory items including figurines, rectangular pieces, boxes and rods (Mackay, 1929:22-3). In the several Mesopotamian texts UET-III, the main item of ivory from Meluhha has been mentioned as buntings (birds).

Lapis Lazuli Sources

It is generally believed that in the third and second millennium B.C. the main source of lapis lazuli was Sutargay and Badakhshan in Afghanistan. But there are also few suggestions that lapis was available in Pakistan too (Webster, 1975:219-22). George Watt (1890:587) has mentioned that "though not known with certainty to occur in India, it was imported into the country, where it was employed for several purposes". Though Valentine Ball (1881:528-30) has reported the occurrence of lapis lazuli near Ajmer in Rajasthan, it has never been substantiated. Edward Balfour (1885:679) has mentioned that lapis was said to be found

in plenty with iron pyrites, amongst the Ajmer hills, especially the Nagpahr range; but this is probably a copper ore. Marshall (1931:543) referred to a Geological Survey of India collection of lazulite from Gulabgarh in the Padar area of southern Kashmir, though he pointed out that for lapis Badakhshan was the most probable source.

Lapis lazuli was used in Mesopotamia for making seals, beads and other ornaments from very early period. Early Harappan sites in Pakistan have yielded a significant quantity of lapis lazuli items. Shahr-i Sokhta and Tepe Hissar appears to have been lapis working centres. The high proportion of waste pieces at Shahr-i Sokhta (Lamberg-Karlovsky and Tosi, 1973:46) suggest that finished objects made here were exported to Sumer. However, it is very difficult to assume that Mesopotamia obtained lapis lazuli from Shahr-i Sokhta. Mesopotamian texts mentioned that lapis lazuli came from either Aratta or Meluhha or Dilmun (Ratnagar, 1981:135). In a hymn to Ninurta (Kramer, 1970:279) carnelian and lapis lazuli come from Meluhha. Gudea (Thureau-Dangin, 1907:134-5) obtained lapis from Meluhha. Ratnagar says that "we cannot rule out the possibility that Harappan sites carried on a transit trade in this much-valued material. This would explain the sporadic occurrence of lapis in Bahrain and its paucity at the sites of Sind and Gujarat as Harappans may have preferred to re-export the stone which fetched a good price in Mesopotamia, rather than to use it in bulk for home consumption". Further she says that "there is no doubt that in Mesopotamia at least lapis lazuli was an expensive commodity. It was desired by the ruling sections of Society for ideological reasons and used in temple consecrations and funerary offerings. This would place substantial quantities of lapis lazuli permanently out of circulation, and in turn make necessary the acquisition of more".

Gold

Gold was obtained by Gudea from the mountains of Meluhha (Thureau-Dangin 1907:70-1). Merchants of Ur obtained gold from Dilmun in the Larsa period (Leemans, 1960:24, 27) which suggests that gold was being traded down the sea route in this period. Rao (1991:175) asserts that the main source of gold for Harappans was Karnataka where Hatti and Kolar mines are still worked. But it is not convincing that how the Harappans developed such a great technology to identify the source of gold buried 50 to 100 metres in the earth.

Gold jewellery in Harappan context have been reported from Mohenjo-daro, Harappa, Lothal, Dholavira and several other sites. These are in the form of beads, conical bead caps, hair ornaments, bracelets and ear-rings. But they do not have any similarities between the ornaments of Indus Valley and Mesopotamia. Business documents of UET-III texts mention the use of gold in making rings, ear ornaments (539), King's statues (559, 568-69), door key (335), pendant (335), mirror (503), gold plated lapis lazuli weapons (378), necklaces (570), to cover lapis-lazuli tablets (617, 620), coiled chains (616) and in several other items. It appears that gold had played a vital role in the economy of Mesopotamia.

Gold pendants and circular shaped beads found in Lothal A (Rao, 1985:591) are quite similar to those found in Ur Early Dynasty II and III (Woolley, 1934), Hissar III (Schmidt, 1937:229). The Royal cemetery at Ur and cemetery A at Kish have yielded spacer beads of gold with five to ten holes (Mackay, 1929:59).

Apart from above commodities several other items were in the list of trade in the business documents of UET-III. These include wool, silver and food stuff which are briefly described below.

Wool and woollen garments made from sheep and goat hair were main products of Mesopotamian region. Several Mesopotamian texts related to the activities of the temple workshops reveal that very large quantities of garments were manufactured, and that single transactions could involve the procurement of as much as 6,400 tons of wool (Adams, 1974:247). Several UET-III mentions about the cloth wool. Text no. 1505 described four types of wool, mixed wool (ha), a total of inferior wool: situ, black wool, dead wool, wool torn by knife, tar-soiled wool and hand-picked wool: muqqu wool, goats hair, tails, spools of quthread. Occasionally it is mentioned that cloth wool was shipped to Dilmun (UET-III:1507) and Magan (UET-III:1511). There are archaeological evidences of production of cloth at several Harappan sites. But Mesopotamian text does not mention its import from Meluhha or any other country.

Only a few items of silver have been found in Harappan sites except at Kunal (Joshi and Bisht, 1994:3) in Haryana where a large quantity of silver was found in the form of ornaments. It is suggested that once substantial quantities of silver came into Mesopotamia from the northwest, much of it was used for exchange in the Gulf trade. Major part of Harappan silver may thus have been acquired from this trade (Ratnagar, 1981:145).

It is very difficult to suggest what the Harappans received from Mesopotamia in the Indus-Mesopotamia trade. Mesopotamia's general exports have been called 'invisible exports' consisting of items such as fish and grain (Crawfords, 1973:232-41).

These could have been her exports to the Indus. David Muhly (1973) writes "that judging from Ur texts the Mesopotamian offered chiefly raw wool and garments made from this wool, as well as silver, in exchange for the products of the east".

Another important aspect necessary to mention here is that the internal trade of Harappans was one of the major causes of its prosperity. It will be relevant to mention a few important items which were sent from Gujarat to other Harappan sites in Sind, Punjab, Haryana and Rajasthan.

Conch shell was one of the most important items which was only available on the coast of Kathiawad and Kachchh. Every excavated Harappan sites have the conch shell and its items. The northern most Harappan site also had the shell object thus indicating how the Harappans had uniformity in the entire country. The shell objects include bangles, pendants, different types of beads and other ornaments.

Another important thing may include semiprecious stone items. It is well known that Cambay was very famous for the semiprecious stones. This infact was an important factor which attracted Harappans to settle here. Semiprecious stones were also distributed in the entire Harappan country. Another trade item, suggested as pottery was distributed from Kachchh to entire Gujarat (Sali, C.G., 1993:145). Sali (1993) has mentioned that red ware, popular in entire Gujarat was manufactured in Kachchh and pots were carried by ships and boats from Kachchh to Saurashtra, till very recently. However the X-ray diffractometry study of Nageswar (Hegde et.al. 1990) and Bet Dwarka (Hashimi, et.al. 1994) pottery suggest that most of them were locally made.

Another possibility is that a few important pots must have been transported to other Harappan sites.

Possibly lapis lazuli was coming to Gujarat from Afghanistan area. As that was the only known source of Lapis, one point was necessary to mention here that Kuntasi a Harappan port site on the head of Gulf of Kachchh had a few duplicate lapis beads (Dhavalikar: 1992, he told during a lecture in the National Institute of Oceanography, Goa). This suggests that perhaps they could not receive sufficient lapis from Afghanistan and were forced to make imitation of the same to fulfill the requirement.

From the above data, it may be concluded that the occurrence of plenty Harappan items in Mesopotamian sites and now also in Bahrain and Oman, suggests that most of the trade was a one way traffic. A very few things such as seals were found in Harappan sites. Therefore, it may be suggested based on present day data that most of the raw material was supplied by the Harappans to Mesopotamia. Future underwater archaeological exploration on the entire Gujarat and Makran coast to locate a Harappan shipwreck with trade goods, can give valuable evidence of the trade that took place between the Indus valley and Mesopotamia.

BOAT-BUILDING ACTIVITIES

A number of Palaeolithic sites have been discovered at different terraces in the east coast particularly in Andhra and Tamil Nadu coasts (Subrahmanyam and Sireesha, 1990:24-34). There would have been the habitation of early man in this area. And being near to the shore early man might have used some kind of float for fishing, of course there are meagre archaeological evidences to support this view. The presence of similar Palaeolithic tools on both the banks of Narmada suggests that perhaps the early man might have used some kind of float system to cross the river.

From bundle floats to plank boats it must have taken a long time. The plank boat was the most advanced form of early water transport. It could have been used for a variety of function and in different environments for it was the only type which could be developed in size to become a ship (McGrail, 1991:90). The direct evidence of plank boats comes from Bronze age, datable to a mid 2nd millennium BC from Ferriby, North Humberside (Wright, 1976

and 1990) and two sea-going vessels of the mid 2nd millennium BC from Cape Gelidonya and Ulu Burun in the eastern Mediterranean (Bass, 1967 and 1989).

A boat motif is depicted in Pachmari cave in red ochre colour (Tripathi, 1995:72) and its date is uncertain. But Tripathi says that there is physical similarity between Pachmari and Harappan boats. However, it is very difficult to say anything about its depiction, since, he had not given even a drawing of that painting. Generally, Pachmari caves are dated to Upper Palaeolithic period and are followed by the late stone age. Therefore, it is difficult to date this depiction.

Harappan civilization is famous for its vastness and uniformity, perhaps, it could be possible only due to a proper trade network. From the very beginning of the civilization (the excavations at Dholavira suggest that Harappans evolve from the pre-Harappan) trade was the main cause of its prosperity. It seems that pre-Harappans migrated or spread from Makran coast to Kachchh probably by the sea route only because it was very short route than by land. Apart from the coastal navigation, river navigation had also played a vital role in the hinterland. About the boat building during Harappan period Mackay (1976:118) writes "Boat-building must be included among the craft of a people whose chief and prosperous city was close to a large and navigable river. A boat carved on one of the seal-amulets has no mast, a sharp upturned prow and steersman seated at the stern. Certain marking on the hull of the vessel suggests that it was made of reeds bound together, a method of building which was used for quite large boats in ancient Egypt. Another representation of a boat is roughly scratched on a pot sherd and resembles the first in that it is high at both ends and has a steersman. The first type of vessel may

have been used exclusively for river traffic and the second for both river and sea". The archaeological evidence of boat-building is very meager and we are dependent largely on a few terracotta boat models and paintings or few graffiti marks found on the potsherds. But a good information is available with the contemporary civilizations like Egypt.

Mesopotamians had imported the wood for boat-building from Magan and Meluhha. UET-III-818, 148, UET-V-292 refers the wood named *gis.mes* = *musukannu.mesu* wood for boat-building. Gershevitch (1957) has identified *musukannu* as *Dalbergia sissoo* (Shisham). This wood has been found in Mohenjo-daro, where it was used as ceiling rafters (Ratnagar, 1981:104). It is strong and elastic timber, useful for making keel and boat frames. Their uses tally with those of *musukannu* wood in the Mesopotamian texts (Ratnagar, 1981:104). Teak wood, largely available in India was used for boat-building in ancient India. Rao (1970:97) believes that teak was used for the boat-building at Lothal in Harappan times as he found the charred wood specimens in the dock. He also mentions that India appears to have exported timber suitable for shipbuilding to Mesopotamia in the reign of King Nebuchadnezzar (604-562 BC). The historical period of Panini (5th century BC) mentioned four types of timbers including *Simsapa* (*Dalbergia sissoo*), *Amra* (*Magnifera indica*), *Samali* (*Bombax malabaricum*) and *Khadira* (*Acacia catechu*) used for making boats (Rao, 1970:97). Alexander, the Great, constructed a fleet with the help of Indian artisans from Pine and Cedar (Bag, 1988:9). The author of *Periplus* (Schoff, 1912:36) had mentioned that Barygaza exported teakwood and ebony to the ports of Apologues (Obollah) and Ommana (Oman) on the south Arabian coast.

Konishi (1985:145-53) has discussed the type of ships built by Harappans in the 3rd and 2nd millennium BC. One of the types can be seen on a pot sherd found in Mackay's excavation of Mohenjo-daro. It has a sharply upturned prow and stern and is apparently controlled by a single oar. This type of boat is said to be still popular among the folks living on the Indus but the stern is somewhat lower than prow. The second type depicted on a seal from Mohenjo-daro has a sharply upturned prow and stern. This archaic feature is noticeable on Minoan seals and pre-dynastic pottery of Egypt and cylinder seals of Sumer. There is a big cabin or shrine on the central deck of the Mohenjo-daro boat which is gaily decorated with streamers in two rows. Fastened at each end is a standard like thing bearing an emblem which is comparable with the ensigns on the ivory handle of Gebel-el-Arab. At the end of the boat a human figure with his double steering oars on ruder can be seen sitting at the poop well above his seat. The boat is shown as if it was lashed together at both stem and stern, indicating perhaps that it was made of reeds. If this big reed boat was furnished with a mast it could have been possible to be used for the longer seafaring trade also.

A potsherd from Mohenjo-daro, had been engraved with a roughly scratched picture of a boat on one side and a couple of pictographic characters on other side. Another potsherd from Harappa is engraved with a motif of a large ship furnished with a big sail hoisted high near prow, and some sort of structure is visible in the centre from where at least two oars are peddled out. The stern seems to be also raked, and an anchor is clearly hanging down from the top of it. Konishi (1985:148) says "it is really fascinating to suppose that such a ship or a galley came in or went out of the dock as observed at Lothal, though the anchor-

stones found in Lothal were all round in shape and not triangular as on the seal from Harappa".

Terracotta Boats From Lothal

1. Pointed prow, blunt stern, sharp keel and low margins. A hole for the mast near the prow and another on margin for a wooden rest for the oar.
2. Curved prow, sharp keel and high margins. A hole away from the centre for the mast. Roughly modeled.
3. Narrow pointed end, flat base and low margins, resembles a canoe, roughly modeled.
4. Similar as above, but well modeled.
5. Narrow end, flat base and low margins.

Among the above five boat models only one has a complete shape and represents a boat with a sail. The second is damaged, with the stern and the prow both carved high up as in the Egyptian boats of Garzean period (Bawon, 1960:117). The keel is pointed and the margins are raised. A hole made a little away from the centre was meant for the mast. In this case, the prow is broken. Three other damaged boats have a flat base and a pointed prow, but the keel is not pointed, nor have they any hole for fixing the mast. These flat based crafts were used in the rivers and creeks without sails, while the other two types with sails and sharp keel plied on the high seas anchored in the deep water of the Gulf. Rao (1985:505) believes that the canoe-type of flat-based boats were the only ones which could be sluiced at high tide through the inlet channel of the second stage into the dock as the width of the inlet was only 23 ft and the depth of the channel was 5 ft. But Greenhill (1976:197) suggests that flat-bottomed are most

useful for sailing with cargoes in shallow tidal water under a single sail.

Rao (1985:412) has mentioned another type of boat which had been painted on a potsherd, appears to be similar to the paintings on the Late Garzean pottery (Bawon, 1960:118). Ratnagar (1981:162) observes several features of Lothal boat in the Phoenician trading ships. This ship had a sharp stem and stern with the stern-post incurved, a relatively flat bottom, a mast carrying a square sail at the centre, and fixed steering paddle. The steering paddle fixed to the hull is a means of propulsion, an advance over the free steering oar held in the hand of the helmsman as seen on the earliest sailing ships (Phillips-Birt, 1971:24-39).

Excavations at Inamgaon has yielded several spouted vessels from chalcolithic level (Malwa and Jorwe period), which bears a boat design (fig. 15). In Malwa period three curved bands (Dhavalikar, 1988:348 fig. 11, T-4) forming high stern prow and one oar is seen. But oar in this boat also showing a rudder type function as this, is shown in aft and top of oar and is projected like a handle of the rudder. But it is difficult to assume what the intention of the potter could be. In Jorwe period, boat designs on spouted vessels were found along with burial goods. The boat designs were better shaped than Malwa period. Here also boat shown with three curved bands forming high prow and two oars are shown differently than earlier one. Here oars are kept in between more towards aft. In absence of any kind of sail these may be considered as representation of river boats.

A few spouted vessels at Daimabad from Malwa culture level bear the similar motifs (fig. 16) as at Inamgaon (Sali, 1986:

297 and 298, Fig. 58, no. 4 and 5, Fig. 59 no. 1), but Sali described the figure 59 no 1 as a figural schematization of stretched thighs and a penis inside the Vagina (Sali, 1986:315) and figure 58 nos. 4-5 as a figural schematization of buttocks on either side of the spout.

Above two examples suggest that this was a common design of Malwa ware and at Inamgaon this motif was continued in Jorwe phase. However, the interpretation of Sali about this motif is unacceptable because it is hard to believe a symbolic sexual painting on a potsherd until we do not have any other supportive evidence to suggest that they had an erotic art. Perhaps, there are no such things reported from any chalcolithic and Bronze Age sites in India.

The study of conch shells at Nageswar suggests that the *Turbinella pyrum* gastropods used at the site were devoid of boreholes which suggest that they were collected from the sea bed away from the shore. It appears that the Harappan shell-working craftsmen at Nageswar had used boats to collect these gastropods (Hegde, et. al., 1990:3). Bhimgaja Talav near Nageswar today is full of a special variety of grass. This grass is locally known as baru (*Sorghum halepensis*). The stem of this grass is 4 m to 5 m tall, thick, tough, hollow and tubular. The stems of this grass appear to have been suitable for building a small sea-going boat. It is interesting to note that Hayerdahl used similar grass to build a vessel for his Kontiki Expedition (Hayerdahl, 1981). It appears that baru was used for building small sea going boats, not only to collect gastropods from the sea bed but also for transporting the manufactured goods like shell bangles, pendants, beads, inlay pieces and ladles to the markets in the Indus delta and beyond (Hegde et. al., 1990: 3).

Before discussing the ship-building activity of the Harappans, we may look into the ship-building evidence of contemporary Civilizations. Because as the research on Harappan Civilization mainly based on land archaeology and not a single attempt has been made to explore possible underwater sites either in Indus area or Mesopotamia and neighbouring sites.

Greenhill (1976:108) notes that, the archaeological evidence suggests that Egyptian vessels were almost all flat-bottomed until Middle Kingdom roughly for the thousand years between 3000 and 2000 BC. Towards the end of this period round-hulled boats began to appear in surviving tomb models and drawings and soon after, in the period of the Middle Kingdom (2045-1780 BC), models of round-hulled boats began to appear in profusion. This change seemed to have been sudden and the flat-bottomed form may have persisted for large cargo vessels. It is interesting to note that one of the Lothal clay boat models had a keel which was of a very unusual character as all the contemporary examples did not show the presence of keel before 2000 BC. For example the Cheops ship without keel was about 43 metre long besides there are other examples from Eridu and Warka are also without keel. About the boat model from Eridu, Barnett (1958) has mentioned that it is a wide boat with a fairly sharp prow and stern, a mast hole slightly off-centre and three holes on the edges probably for securing the sail ropes. The ends are upturned, the sides high and the base rounded.

Herodotus in the 5th century BC writes about the construction of cargo carrying ships in contemporary Egypt: "their ships for carrying cargo are made of acantha (acacia).....from

this tree they cut logs of two cubits length and put them together like bricks in a wall" (Greenhill, 1976:161).

Excavation of a ship wreck at Cape Geldonya in 1960 was the beginning of the discovery of bronze age shipwrecks in Mediterranean waters. As per the cargo of the ship, Boss suggested (1967) that the ship belongs to a Syrian scrap metal dealer, who was also a tinker making his way from Cyprus by the coast of Turkey to the Aegean, supplementing his food with olives and fish, perhaps playing knuckle-bones in his spare moments by the light of the single lamp. The length of the ship may not have been much more than 8 or 9 m. The minimum dimension gives us a ship quite capable of carrying the cargo, which weighed approximately 1,000 kg; in addition, there were 116 kg of ballast stones (Taylor, 1965). With this reference it may be surmised that a coastal sailing boat of third millennium BC boat probably had a length between 8 and 15 m which could carry a cargo of 1 to 3 tons. Perhaps this amount of cargo in third millennium BC would have much more significance than what we assume.

Another shipwreck at Ulu Burun, about 300 km west of Cape Gelidonya shipwreck, was excavated and dated to late Bronze Age. On the basis of ceramics Bass (1986:269-96) dates the wreck to early in the 14th century BC about 150 years older than the ship at Gelidonya. The cargo includes ivory, glass, copper ingots in hundreds, amphoras, stirrups, jars, silver bracelets and timber (Throckmorton, 1987:32). On the basis of cargoes the size of the ship should be at least double of the Cape Gelidonya ship, approximately 16 to 18 m in length.

Business documents of Ur-III (805) refers to the different parts of the boat as, keel, mast, plough head, doors of boat cabin,

rudder etc. which makes clear their expertise in boat-building. Text from UET-III (830) also mentions sheep-skin boats and leather boats. These documents clearly suggests that in third millennium BC boat-building activities was one of the most active industries.

The river transport was another important aspect of hinterland trade which helped in redistribution and administrative control. Rivers like Indus and Saraswati might have been navigable during Indus civilization as mentioned in Rigveda that ninety nine rivers was navigable. The growth of civilizations on the river valleys can be attributed not only to the high productivity of the respective regions, but also to the ease with which products could be moved along the large and navigable rivers. Even in the historical period, Strabo (McCrimble, 1877:19) mentions that "whole of India was watered by rivers some of which unite with two of the greatest, the Indus and Ganges". Further he says that "the merchants of the present day sailing from Egypt to India by the Nile and the Arabian Gulf have seldom made a voyage as far as the Ganges". The silver bitumen boat models and a boat on a stone relief from Ur were probably river boats (Ratnagar, 1981:179). The models show a long, flat-bottom craft, with different depth and upturned stem and stern which seems to be row boats. Hodges (1970: figs. 82 & 83) mentions a twentieth century boat in southern Iraq which is similar to the model from Ur. A river boat with cabin and oars or paddles and upturned ends (Mackay, 1938:340) is similar to the present day battelas of the lower Indus (Greenhill, 1971:178).

It is very difficult to say anything about the use of wind by the 3rd millennium BC sailors. However, Rao (1970:99) has mentioned that "long before Hippalus discovered the monsoon-

winds, Indian sailors possessed a sound knowledge of the periodicity and regularity of the winds in the Indian Ocean without which the Harappan vessels could not have made regular voyages to the East African coast (Socotora), Egypt, the Bahrain islands and the Persian Gulf as suggested by the exchange of luxury articles and daily necessities". It is difficult to assume what kind of sail was used by the Harappans. It appears that they used mostly square sail. Further, it may be suggested that, sailors from Meluhha to Persian Gulf must have used the wind direction in one particular time. Moreover, the Harappan port in regular interval must have played a significant role for providing a safer voyage to the Persian Gulf.

Rao (1993:60) has referred to Bet Dwarka as the late Harappan boat-building centre. He refers to two rock-cut slipways which were supposed to be used for launching the boat in the sea. However, this needs a detailed study to establish this fact.

There are several references to maritime activities in Rigveda. A general word for boat or ship is *nau*. A few other words also used for water crafts as *tari* (X.69.7); *tarani* (III.29.13, VII.26.4, VII.32.9, VII.67.8, VIII.49.8); *pratarani* (V.46.1); *plava* (I.182.5) and *drun* (VIII.85.11). Bisht (1988:13) believes that *drun* was a raft made of logs or a small hollowed out canoe; *tari* is not a frequently occurring word like *plava*, although all of them mean a water-craft of a lesser or bigger dimension. However, a *tarani* fitted with sails though, appears to be a river-vessel carrying provisions.

A large ship was fitted and furnished with oars (*aritra* I.116.5, X.63.10), masts (called *bandhura*, *skambha* or *stambha*: I.34.2; I.34.9; VII.69.2), sails (I.34.1), ropes (VII.69.7) and wheels

perhaps for rolling up and loosening sails or anchors (X.41.1). Similar type of numerous references occur in Rigveda. Ramayana (II.89.11-26) mentions the march of 500 well built ships with Swastika signs which had gay flags, full sails and were fitted with large gongs. The Astadhyayi (IV.3.10; VI.3.58) makes a clear distinction between coastal island cargoes (*Dvaipya*) and mid-ocean island cargoes (*Dvaipa* or *Dvaipaka*). The Kautilya's *Arthasastra* (II.28) also mentions that the ship was under a *Navadhyaksa*, who was concerned not only with the navigation of the ocean but also with island and river transport.

It may be relevant to mention a few examples of boat scenes depicted in historical paintings and carvings. There is a depiction of a boat on a medallion from Bharhut (Cunningham, 1879) in which one of the persons is being swallowed by a monstrous whale or sea animal with rows of serrated teeth, causing surprise to the crew of the boat. Another important depiction from a panel on the south pillar among the lower panels of the eastern gateways of Sanchi Stupa is that of a river boat in fresh-water indicated by lilies and lotuses carrying an ascetic and manned by a man and woman, while on shore are four devotees (Nalini Rao, 1988:94).

Recent marine archaeological explorations off Dwarka, Somnath in Gujarat and Vijaydurg in Maharashtra brought to light a different type of stone anchors such as triangular and grapnel with three holes. It is similar to those anchors found at Ras Shamra, a Mesopotamian site on the Mediterranean coast datable to 2500 BC. However, the date of stone anchors from Indian waters is unknown. To have a better idea of boat-building activity, it is necessary to explore the sea bed at maximum possible places. Because, in early period, man might have followed coastal

navigation. The biggest problem with Gujarat coast is its rapid sedimentation. It is quite likely that if any bronze age ship was wrecked then certainly it would be several metres in the sediments which would make it difficult both exploration and identification. In this connection it may be suggested that, the offshore explorations along the Gujarat coast where rocks are exposed in seabed, may yield the remains of some shipwrecks. However, in that case too the chances of survival of any part of the ship would be very faint.

9

DECLINE OF HARAPPAN PORTS

About the decline of Harappan Civilization Dales (1966:92) writes that, "One of the most enigmatic whodunits of antiquity concerns the decline and fall of the Indus Valley civilization. Remains of this vast civilization of South Asia are scattered over an area considerably larger than those covered by either ancient Egypt or Mesopotamia. The life cycle of this third major experiment in the origin and development of the world's earliest civilization is at present highly speculative and is the subject of increasingly intensive investigation by archaeologists, historians, linguists and natural scientists. Some where in 18th century BC Indus civilization marked by a decline and abandonment of cities and reversal to rural economy". Harappan civilization survived for about a thousand years from its evolution to the decline period. There are several questions to be resolved about its disappearance from the Indus-Saraswati region. In case of the decline of Gujarat Harappans, natural calamity probably was solely responsible. A brief account on tectonic movement, coastal erosion, sedimentation and sea level fluctuations and flood theory

were suggested by Raikes and Rao (1991:326) are discussed here to understand the real cause for its decline.

Climatic Factors

There is a general concept that the climatic conditions have changes played a vital role for the human settlement in the past. Marshall (1931:2) excavated Mohenjo-daro and observed, that both the climate and physical aspects of the country had undergone material changes since Harappan times. The universal use of baked bricks instead of sun-dried bricks and the class of animals commonly found in damp jungle country engraved on the seal-amulets (such as tiger, rhinoceros and elephant) were adduced to support this hypothesis. Above evidences certainly point to a heavier rainfall than that of Sind enjoys today.

Thaper (1977:68-9) suggests a dry climate during the pre-Harappan and Harappan phase at Kalibangan. His suggestions are based on the following evidences from the excavation. 1. Sun-dried bricks used for the construction of most of the important building. A few street paved with sun-dried bricks only. 2. The occurrence of barley (which could grow even in harsh climatic conditions) as cereal crop (Vishnu-Mittre, 1974:18-19). Barley is generally grown in areas where winter rainfall is deficient or where soils are alkaline (Bakshi and Rana, 1974:47-52). Similarly, the discovery of cotton, millet and rice, which are products of temperate climate, shows that there was not much change in climate when Lothal was flourishing (Raghunath 1977:105-6). Even today Rajasthan and Northern Gujarat fall with in the dry climate belt.

Pollen analysis studies have indicated a dry period between 1800 BC and 1500 BC. In the arid belt the Lunkaransar lake had

started drying out while, in semi arid belt, the lakes began to turn saline. About the effect of aridity on Harappan culture Singh (1971:188) says "the present evidence would suggest that the onset of aridity in the region around 1800 BC, probably resulted in the weakening of Harappan culture in the arid and semi-arid parts of north-west India but that the peripheral areas of the culture, such as in Gujarat and the Himalayan foot-hills were not affected to the same degree. The extinction of the Indus culture may thus have been initiated through gradual decline as a result of climatic change".

A study of a sediment core collected off Karwar indicated peaked monsoon rain fall around 4000 years BP and 3500 years BP (Nigam and Khare, 1992) contrary to earlier observation by Ramaswami (1968) where he has mentioned an uniform monsoon between 4000 years BP and 2500 years BP. Whereas, the core collected off Oman margin suggested a gradual decline in wet climate from 5000 years BP, touched its nadir around 3500 years BP, leading to onset of arid climate in tropics (Naidu, 1996). On the other hand, Raikes (1967) advocated that there were no significant climatic changes in the past 9000 years BP. Irrespective of the diverse opinions, the climate appears to had a significant influence on human civilization, its growth and decline. If some settlements were abandoned due to floods as a result of peaked precipitation, some others might have come to an end due to severe aridity. However, in absence of convincing evidences with regard to the influence of climatic extremities on the decline of civilizations, it becomes difficult to accept climate changes as the sole factor.

Tectonic Effect

Tectonic movements operate from within the interior of the earth, but are expressed at the surface by a displacement of the crust resulting in uplift and depression of varying degree, relative to a fixed datum.

Sahni (1956) has put forward the tectonic uplift in Sind as a contributory cause of decline of a few Harappan cities. He corroborated his view with the earthquake event of 1819 near Hyderabad in Sind which led to a sudden local uplift of part of the flood plain of the Indus. This earthquake remitted in flooding of about 2000 square miles which endured for about two years and land uplifted about 15 feet above the flood plain. Based on this evidence, Raikes (1964:290) suggested that, such an occurrence near Mohenjo-daro could very easily have accounted for the still-water flood conditions necessary to explain the great depth of silt. Thus the geological and hydrological changes that occurred due to tectonic activity during those civilization periods reasonably fit into the archaeological records (Raikes, 1964).

From the various study and analysis it is understood that the Saurashtra peninsula and Kachchh lie in a seismic belt (Lele, 1968) where catastrophic earthquakes have occurred during the last 300 years (fig. 22-23). The frequency of major earthquakes, however, does not appear to be large (Marathe, 1981:17).

The recent studies on sea level changes also suggest that neotectonic activity had played a vital role in the sea level fluctuations particularly in Saurashtra and Bombay region during the Late Pleistocene/ Holocene (Rao, et. al. 1996: 110). It was suggested that about 12000 years BP sea level was around 90 m

lower than present, followed by a rapid rise reaching a level of 8 to 10 m higher than present during Early Holocene due to neotectonic activities.

Dales (1966:95) discovered few Harappan sites along the Makran coast. He believes that the sites on Makran coast have served as seaports during 3rd millennium BC, but now they are located as far as 40 Km inland. These displaced ports probably provide evidences in support of the tectonic uplift of Pakistan coast during the past 4000 years.

The tectonic activity which was responsible for the rising of the Aravali Range appears to have forced the Saraswati to shift its course eastward (Valdiya, 1996:23). Valdiya (1996) believes that the Chautang channel possibly represents the course abandoned by the eastward migration of Saraswati. The existence of Vedic-river Saraswati has been confirmed by Satellite imageries. Some of the geological records do show the buried channels of river Saraswati. The evidences of tectonic are available in Mohenjo-daro and Kalibangan excavations.

Some preliminary evidences of earthquake have been recorded from phase III of Dholavira in Khadir Bet of Rann of Kachchh (Bisht, 1996: Personal communication) dated to around 2200 BC. The disastrous effects of earthquake such as collapse of houses, diversion of drainage system and the uplift of Rann appears to be responsible for the decline of Harappans at Dholavira. The secondary reasons of importance for the Harappan decline could be the trade-loss. As the river Saraswati became shallower due to tectonic upliftment in the region and subsequent silting as a result of intense erosion, probably have rendered this commercially important river non-navigable. Assuming that the

Harappans prosperity was trade-dependent, the losses due to burial of Saraswati might have turned into trade disaster forcing the settlers to migrate out in search of new safe regions. The defense wall noticed at Dholavira, suggests that the Harappans were facing major problem of wall erosion which is evident in several thin layers of plaster on the outer defense walls suggesting repair at regular intervals.

Sea Level Fluctuation

The morphological changes in coastline have significant effect on the human settlement. In the case of Gujarat, the changes in shoreline are more important as affects the maritime activity oriented civilization. The sea level fluctuation have been recorded through the geological history. Several recent studies have indicated that the Holocene also has witnessed sea level changes.

It is generally believed that about 35,000 years BP sea level stood at present day shoreline (Paskoff & Sanlaville, 1977), while around 18,000 BP it reached its lowest level (Blackwelder, 1979:618-20).

Regarding the Holocene sea level rise, there are various views, which can be divided into three groups. The first group claims that sea level has rose rapidly until the 6000 years BP, and stood at about 3 m above the present level and later fluctuated with an amplitude of 6 m (Fairbridge, 1961). The second group favours a steadily rising sea-level during the Holocene reaching its present level at about 3600 to 5000 BP (Godwin et al. 1958, Fisk, 1951 and McFarlan, 1961). The third group opposes the hypothesis of higher sea-level during the Holocene than the

present level and believes in a constant sea-level later 3600 BP. However, the hypothesis suggesting rapid fluctuations during the Holocene is more plausible based on studies in various parts of the world.

Fairbridge (1961:99-185) proposed a Holocene sea level curve based on the combination of data from many regions. The curve indicates that the Holocene rise in the sea level was spasmodic which included regressive as well as transgressive phases. Further, an elevated sea level by about 3.7 m above the present level was evident around 5700, 4900, 3700, 2400, 2200 and 1000 BP. Several studies in the past have indicated sea level fluctuations on local scale along the West coast of India during the Holocene (Nair and Hashimi, 1988; Hashimi et.al., 1995; Agrawal et.al.; 1973 and Rao, 1990). However there is no agreement regarding the magnitude of fluctuations. It is a well known fact that, the sea level rise can lead to devastating effects on human settlement. Therefore, it is apparent that, such sea level fluctuations during the periods of civilization have been partly responsible for decline of well established Harappan settlements.

Sarma (1971:288-94), provided a reasonable linkage between rise and decline of Harappan civilization and ecological parameters. In the tropical regions the post glacial rise in sea level was accompanied by increased precipitation, alluvial siltation, expansion of tropical monsoon-fed lakes and a corresponding rise in the ground water table. A close correspondence between the development of the Harappan culture and the rise in the sea level c. 2,400-2,300 BC and subsequent decline of the civilization c. 1,750-1,700 BC at the time of dropped sea level was proposed (Sarma, 1971).

A few late Harappan settlements were found scattered between river Narmada, Tapti and Kim. Among them Bhagatrav, Mehgam and Malvan are major settlements. Bhagatrav was established around 2000 BC on the mouth of river Kim (Rao, 1985:585). Presently, Bhagatrav mound has been eroded significantly by the Kim river and backwaters of the sea entering the creek. Varaprasad and Rao (1988:89) suggested that this port must have been abandoned around 1900 BC, due to rise in sea level. Similarly, another late Harappan port Mehgam which is dated to be 1900 to 1600 BC, was abandoned due to the sea level rise (Rao 1988:90). But certainly in Kachchh, Saurashtra and Kathiawad the Harappan culture might have declined also due to other reasons in addition to sea level rise. Therefore, it is necessary to look into other causes of decline. A few important Harappan ports such as Kuntasi (Dhavalikar: 1991:37), Nageswar (Hegde et al., 1990), Dholavira (Bisht: 1991) and several other coastal Harappan settlements suggest that sea level rise was not only the factor of decline of the settlement.

A few Harappan sites in Makran coast suggest that the ancient shoreline was much nearer to the Balakot and Sutkagen-dor which were supposed to be the Harappan ports but presently these sites are situated at about 9 and 12 km interior respectively. But a few Harappan sites in Gujarat are located very close to present shoreline particularly in southern and northern Saurashtra coast, suggesting that there has been no change in Saurashtra coast. Therefore, it is relevant to conclude that very little change of ancient shoreline at least in Saurashtra coast has taken place in last 5000 years.

The sea level in Saurashtra coast during the interglacial around 1,20,000 years BP and the interstadial around 30,000 years

BP and around 6,000 BP had reached about 2-6 m higher than today (Gupta, 1977b). This study shows that, sites like Lothal, Rangpur, Nageswar and a few other coastal sites were very close to the sea coast and possibly served as seaport. But one should take into account that, if entire Saurashtra coast witnessed the sea level rise in 6,000 BP then a site like Padri (near Bhavnagar) which is just two km from the present shoreline would have been underwater during protohistoric period. Therefore, one can not take into consideration as the equal behaviour of shoreline even in one coast (fig. 17).

The excavations at Dwarka (Ansari and Mate, 1966) showed that the site, which is at least 2000 years old, was twice submerged below the sea, the earliest settlement is found buried under 5 m thick sand layer. The climatic and historical evidences from the borders of the Rann of Kachchh suggest the existence of a shallow sea in the recent past. The rise in sea level in 15th-14th century BC in the gulf of Kachchh is corroborated by underwater explorations in Dwarka waters. After some centuries the sea level fell, but again rose in the first few centuries of the Christian era as indicated by the wharf in the Elephanta island off Bombay.

Sedimentations

An unusual phenomenon appeared in Kachchh region that is sedimentation. The Great Rann and Little Rann comprise unique examples of Holocene sedimentation. The two Ranns represent filled-up gulf and mark the site of accumulation in an estuarine delta environment that was marked by a fluctuating strandline since advent of the Holocene. During the last 10,000 years the area came under the influence of glacio-eustasy and seismicity-related tectonism, Table No. 4 clearly shows that a

10 m sand or silt deposition in Rann of Kachchh from about 4000 years BP and 2 m deposition during last 2000 years took place. With this observation it is quite clear that prior to 4000 years BP the mighty river Saraswati was debauching in Rann of Kachchh resulting a rapid siltation at the mouth of Kori creek. As the Kori creek mouth narrow, the Rann probably has become a brackish water lake and whatever silt came from the river deposited in the Rann. There are several evidences to show that prior to 4000 years BP Rann was about 10 to 12 m deep which was sufficient for navigation. Therefore, the Harappans of this region enjoyed a great potential for the navigation and safest harbour of 3rd millennium BC. As the river Saraswati was debauching at the Rann area, the probability of river navigation up to Kalibangan is Rajasthan could not be ruled out. The scientific data also match with the literary references, as mentioned earlier by author of Periplus of Erythrean Sea that around the beginning of Christian era the Rann has become unsafe for navigation.

Above studies clearly show that, both the Ranns were navigable when Indus civilization was flourishing. Later rapid siltation in Kachchh resulted in shallowing of Rann rendering the region unsafe for navigation around the beginning of Christian era. This might be one of the reasons for decline of Harappan settlement at Dholavira. Thus it appears that a cumulative effect of sea level fluctuation, tectonic instability, rapid siltation of navigable river and estuarine area and climates have played a decisive role in the decline of once prosperous Harappan civilization. However, the socio-political conditions also need a attention before drawing any conclusion about Harappan decline.

Table: 4. Stratigraphy of Ranns of Kachchh (After S.S. Merh, 1995:160)

Age	Great Rann		Little Rann		Environment of Deposition
	Sediments	Thickness	Sediments	Thickness	
Late Holo-cene	Brown to dark brown silty clay with organic matter (LTZ AND ZBZ)	0 to 2 m	Brownish grey silt and clay	0-0.5 m	Fluvio-marine Deposition during progressive withdrawal of a high sea.
2,000 years B.P.					
	Fluvial sands and silts (Bet zone and Banni plains)	10 m	Fluvial sands and silts with intermixed clays and salt gypsum nodules.	1-2.5 m	Fluvial. (Indus-Luni and Banas Saraswati delta systems)
3,000 to 4,000 BP					
Middle Holo-cene	Blue/green tidal clays	Not known	Green to blue clays with wood fragments and forams.	1-9 m.	Marine Related to Flandrian high sea.
6,000 years BP					
Early Holo. to late Pleis.	Sands and silts details not known	Not known	Coarse, gritty sands (brine bearing) with intercalated silt clay and limegypsum nodules.	45-50	Fluvial. Related to last glacial (W) regression
10,000 to 18,000 years BP					

Social and Political Problem

Mesopotamian tablets mention the seizure of the Meluhha trade around 2100 BC for hitherto unknown reasons. This ancient embargo on Meluhha trade by the Mesopotamian probably has turned in to a socio-economic tragedy for the Harappans. Even after such a tragedy the Harappan civilization still continued only because their trade contacts with other gulf countries and perhaps with Egyptian civilization were alive. The combined effects of natural calamities and trade loss with Mesopotamia, Indus people made to struggle for their survival and meantime they tried to keep their identity as the seafarer by moving southward up to Diamabad. But unfortunately they could not succeed in maintaining their identity due to local pressures and subsequently were diffused into the local cultures.

10

CONCLUSIONS

- Early man had preferred the Gujarat coast to establish his settlements because, the region has a longest coast and punctuated by perennial rivers. This characteristic geological feature might have attracted early settlers by providing ample food, raw materials, opportunity for maritime trade and development.
- All the three phases of Palaeolithic human evolution have been recognised on the river valleys in entire Gujarat. The sites of Lower Palaeolithic period have been located almost all over Gujarat, followed by Middle and Upper Palaeolithic; though, the latter two are relatively less known in terms of their distribution and chronology. However, Mesolithic sites are densely distributed in this region and more than 400 sites have been discovered from all over the state. From the available archaeological records it appears that the Mesolithic man might have ventured into the sea for the exploration of marine resources. The extensively excavated Mesolithic site at

Langhnaj has yielded 14 human skeletons suggesting an unambiguous settlement and systematic customary practices of Mesolithic period.

- Prior to the Harappans settlement, Gujarat was already inhabited by the regional chalcolithic communities. The evidences have been recorded from Lothal (Micaceous Red Ware), Prabhas-Patan (Pre-Prabhasa Wares) and several other sites have been witnessed the occurrence of regional wares like Anart Ware and Padri Ware. The Pre-Harappan of Kachchh region have the influence of Amri and Kot Diji ware which often represented by the fine pink to red ware with high featureless rims. The study suggest that the pre-Harappans have migrated from West to East between the last quarter of 4th millennium BC to first quarter of 3rd millennium BC in Northern Gujarat.
- Harappan settlement may be dated between 2500 and 1900 BC and large number of sites were established during this period. The important excavated sites of this phase are Lothal, Rangpur, Kuntasi, Dholavira, Padri, Surkotada, Prabhas-Patan (Somnath), Desalpur, Khirasar, Bagsra and many more in Kachchh area. The characteristic features of this period is fabulous town planning, which include drainage system, proper layout of roads, and fortification. The majority of pottery of this period is characterised by Red Ware with major shapes like dish-on-stand, carinated dishes, S-shaped jars, perforated jars etc.
- Late Harappan settlements have been discovered in very large area of Gujarat and may be dated between 1900 and 1500 BC. Excavations at Rangpur, Lothal, Surkotada and

Dholavira have conclusively proved that the Indus Civilization did not perish and survived in a decadent form in Gujarat. Saurashtra witnessed spurt in settlement and perhaps several time more than the Mature Harappan settlements. Late Harappans were followed by the Lustrous Red Ware users and their remains have been noticed at Rangpur, Rojdi and several other sites in Saurashtra.

- The excavations of Lothal, Kuntasi, Nageswar and Padri have conclusively proved that, Harappans have exploited the marine resources and also ventured for a long voyage up to Persian Gulf. It is also suggested that major attraction for Harappans in Gujarat was its long coastline which provided plenty of opportunity for exploitation of marine resources. Discovery of dockyard at Lothal and jetty at Kuntasi have proved that they had well established marine trade network. Harappans had a proper planned internal trade network which has led to the amazing uniformity in all respects of this civilization. The location of Dholavira indicate that this might have been severed as a very safe port and the transit port for river navigation in mighty river Saraswati. More than 35 Mature Harappan sites are located all along the Gujarat coast.
- The maritime activities of Harappans have been very well recorded in almost all settlements. The sites discovered in Rupen and Saraswati estuaries provided the valuable information on the shell fishing and the exploitation of other marine resources. The shell artefacts are widely distributed in Harappan sites which suggest that this was one of the major industries of Harappans. The conch shell bangles and other objects from several sites in Gulf countries and in Mesopotamia clearly suggest that the Harappans of Gujarat had established

export/import contacts with Mesopotamia and Gulf. The major items of trade between Indus and Mesopotamian civilization include shell objects, beads of semiprecious stones, copper, wood and pottery.

- Thus the present study has demonstrated that, the Harappans settlements in Gujarat have enough evidences to suggest an active overseas trade with its contemporary western civilizations. Inscriptions from Mesopotamian sites have frequently mentioned about the overseas trade with Meluhha. The term Meluhha is widely accepted as the Indus region. Several excavations of Bronze Age sites in Oman, Bahrain and United Arab Emirates yielded Harappan seals, semiprecious stone beads and Indus pottery. These evidences clearly demonstrate the maritime trade in 3rd millennium BC. There are also evidences in favour of the maritime relations with East African coast particularly with Egypt. This is confirmed by the presence of terracotta model of mummy and Gorilla at Lothal. A seal believed to be of Egyptian origin was found at Rangpur further confirms the maritime relation with Egypt.
- Gujarat holds the largest number of sites of Late Harappan phase and several of them are situated in coastal areas. Excavations at these sites yielded plenty of evidences on maritime activities. Excavations at Bet Dwarka brought to light a large quantity of conch shells. A seal made out of conch shell which has Bahrainian style suggest that Bet Dwarka settlers had trade contact with Gulf countries during late phase of Harappan civilization. Two inscriptions of Late Harappan period were also found from Bet Dwarka. Though Dwarka has been suggested as the port of Late Harappan period (1500 BC)

where a large number of submerged structures in a water depth of 3 to 6 m have been reported besides different types of stone anchors. However, recent explorations have indicated that the submerged structures of Dwarka may be of younger age and the subject is still under debate, e.g., recent explorations on Indian coast brought to light a large number of stone anchors which are dated not earlier than 8th century AD. Therefore, the present study suggests that Dwarka was a very active port during Historical and Medieval Period. Several other ports of this period are located in Southern Gujarat coast.

- There are ample evidences on the boat-building activities during Harappan period. The boat models from Harappan sites have indicated that they were making boats for coastal and river navigation. Excavations of a few shipwrecks of Bronze Age in Mediterranean waters indicated that they were of 1 to 3 tonnage vessels with 8 to 12 m in length.
- The present study with reasonable speculation suggests that, the change in climate, tectonic activities and sea level fluctuations played a significant role in decline of Harappan civilization in Gujarat. Now, it is widely accepted that around 5000 to 6000 years BP sea level was 2-6 m higher than present. A few sites presently located around 20 kms interior from the present coastline must have been very close to the coast during Harappan times. Tectonic activity might have led to the destruction of Harappan ports in Kachchh in particular and Gujarat in general. Tectonic activity might have modified the course of the river Saraswati and rapid siltation in the Rann of Kachchh which appears to have severely affected the Harappan trade activity, resulting in gradual decline.

SECTION II

ABBREVIATIONS

AA	American Anthropologist
AI	Ancient India
ASI	Archaeological Survey of India
AUAE	Archaeology in the United Arab Emirates
CSIR	Council of Scientific & Industrial Research
DCPRIB	Deccan Collage Post-Graduate Research Institute Bulletin
EAWI	Ecology and Archaeology of Western India
EW	East and West
FIC	Frontiers of Indus Civilization
GSAB	Geological Society of American Bulletin
IAR	Indian Archaeology-A Review
IJES	Indian Journal of Earth Science
IJMS	Indian Journal of Marine Sciences
IJNA	International Journal of Nautical Archaeology
JAOS	Journal of American Oriental Research
JCA	Journal of Central Asia
JEA	Journal of Egyptian Archaeology
JESHO	Journal of Economic Social History Oriental
JGSI	Journal of Geological Society of India
JRAS	Journal of Royal Asiatic Society
MAC	Marine Archaeology Centre
MAIOC	Marine Archaeology of Indian Ocean Countries
ME	Man and Environment
MJ	Museum Journal
MM	Mariners Mirror
NGRI	National Geophysics Research Institute

NIO	National Institute of Oceanography
RAMA	Recent Advances in Marine Archaeology
SA	Scientific American
SAA	South Asian Archaeology
TRURIMA	The Role of Universities and Research Institutes in The Study of Marine Archaeology.

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- Fig. 4** : Courtesy: Archaeological Survey of India
Fig. 5 -13 & 17 : Courtesy: Marine Archaeology Centre of NIO, Goa
Fig. 14 : Courtesy: Dr. K.M. Srivastava
Fig. 15 : After M.K. Dhavalikar, 1988
Fig. 16 : Courtesy: Archaeological Survey of India

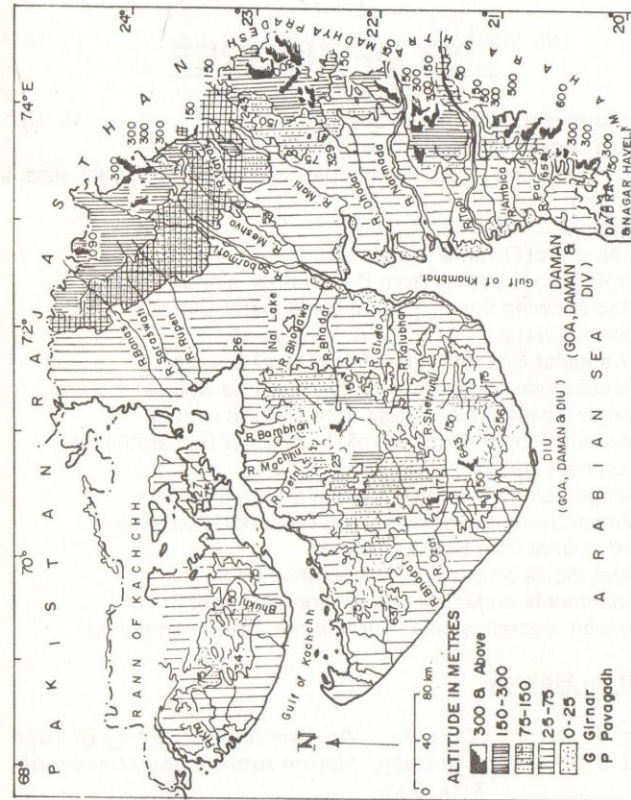


FIG. 1. Map showing altitude of Gujarat.

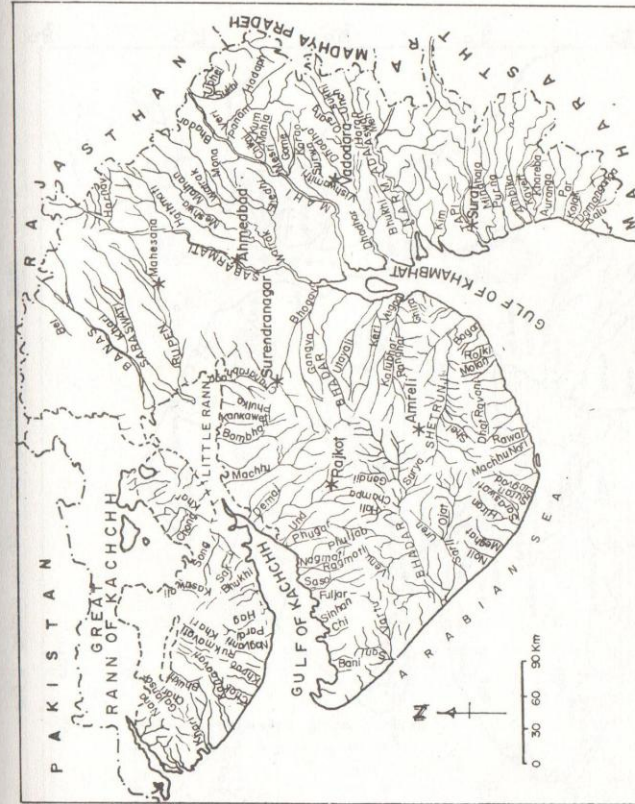


FIG. 2. Map of drainage system of Gujarat.

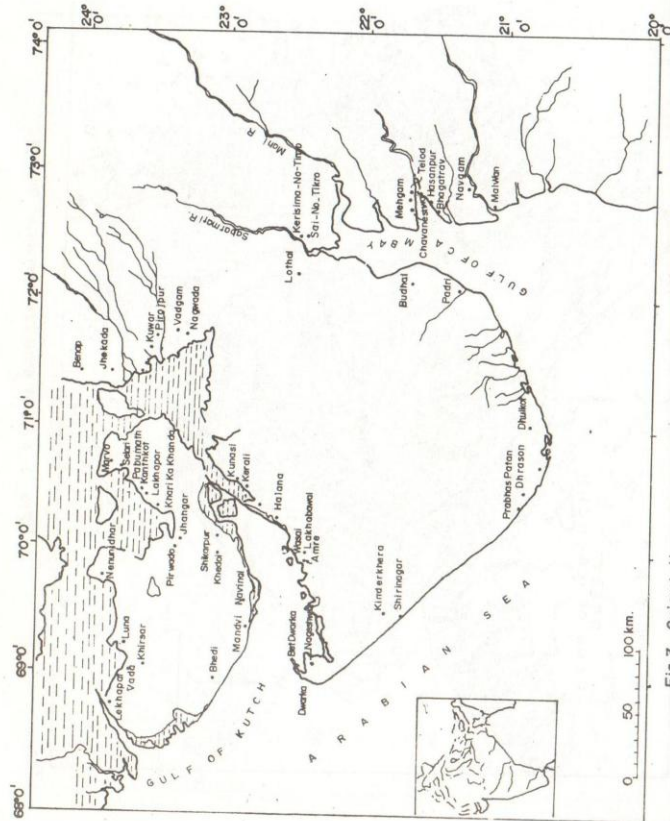


Fig. 3. Gujarat Harappan Late Harappan Coastal Sites.

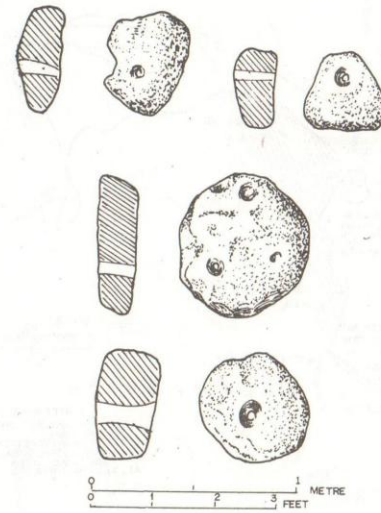


FIG. 4. Lothal: Perforated stone anchors

(After S. R. Rao, 1973 fig. 31)

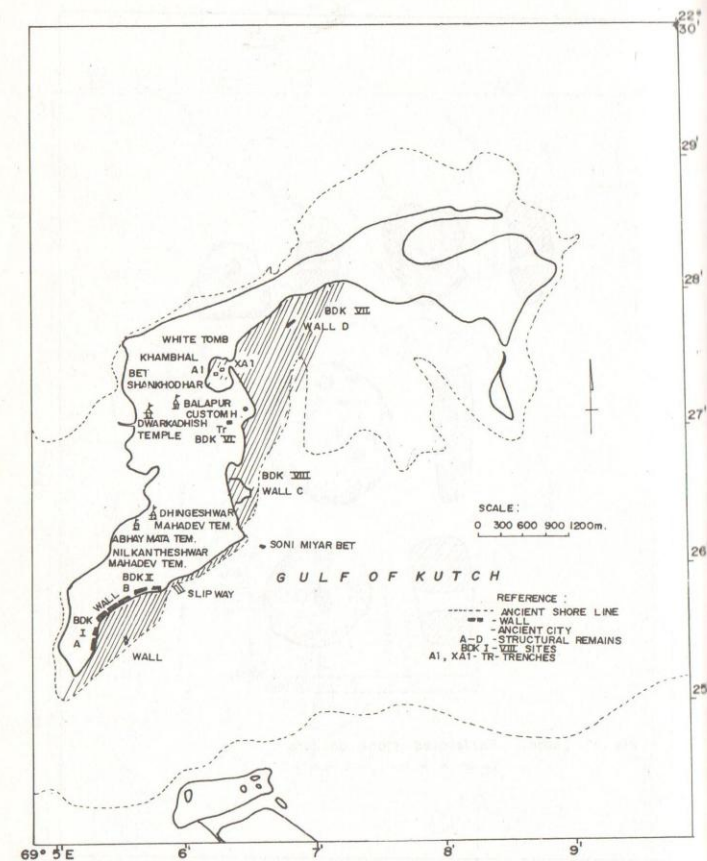


FIG. 5. Map of Bet Dwarka exploration.

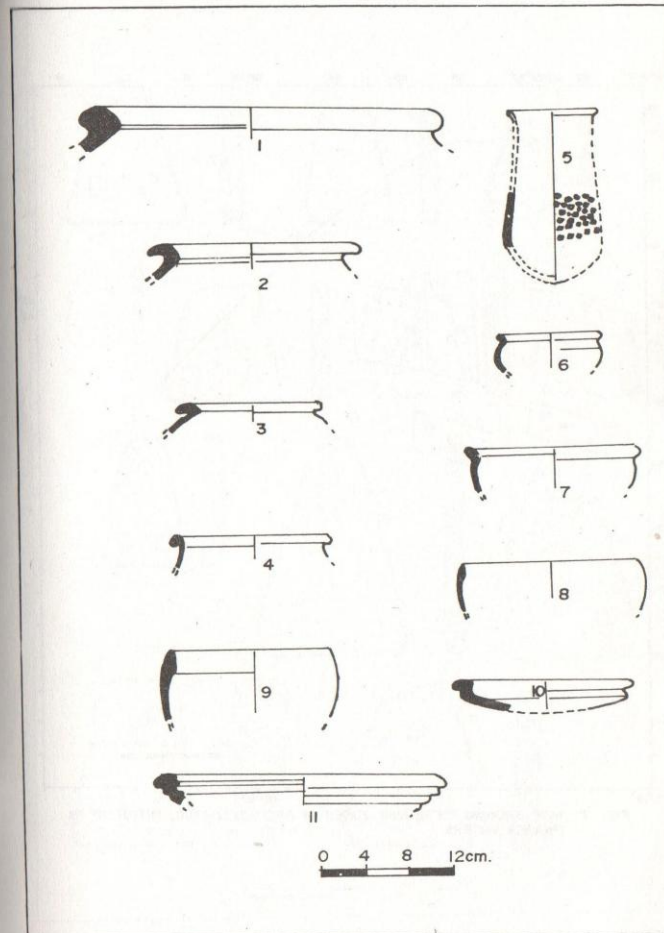


Fig.6 Protohistoric Pottery from Bet Dwarka.

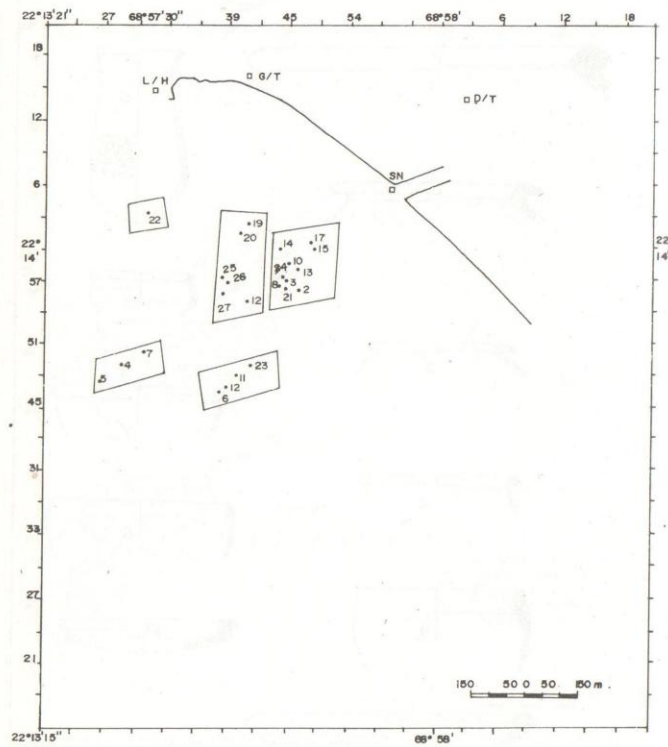


FIG. 7 MAP SHOWING DIFFERENT ZONES OF ARCHAEOLOGICAL INTEREST IN DWARKA WATERS

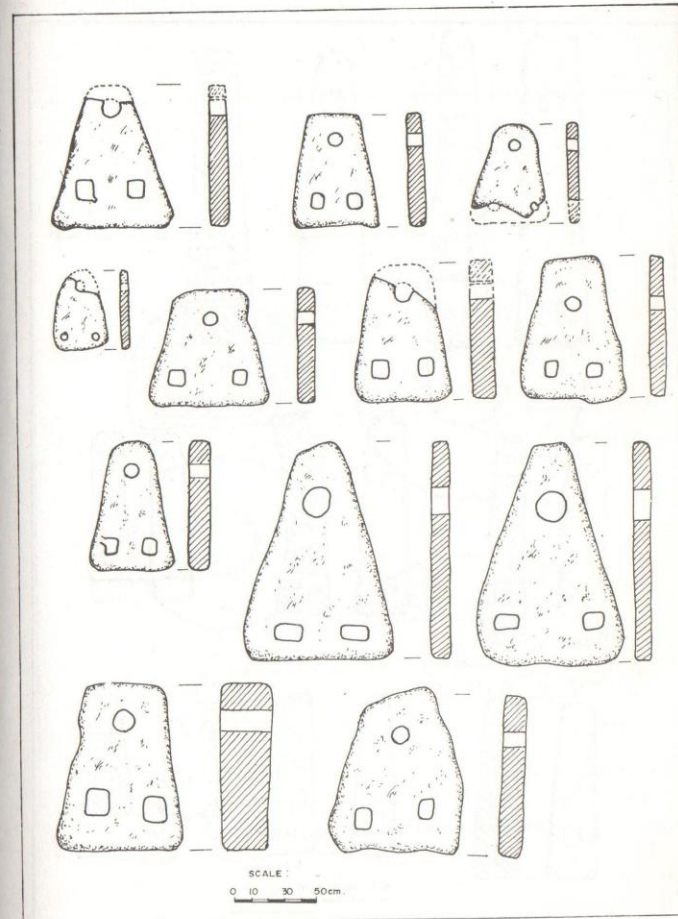
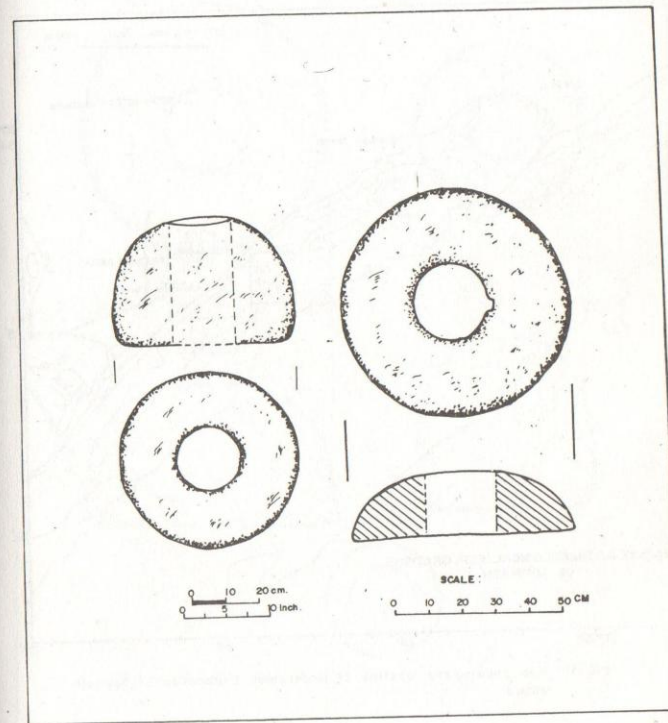
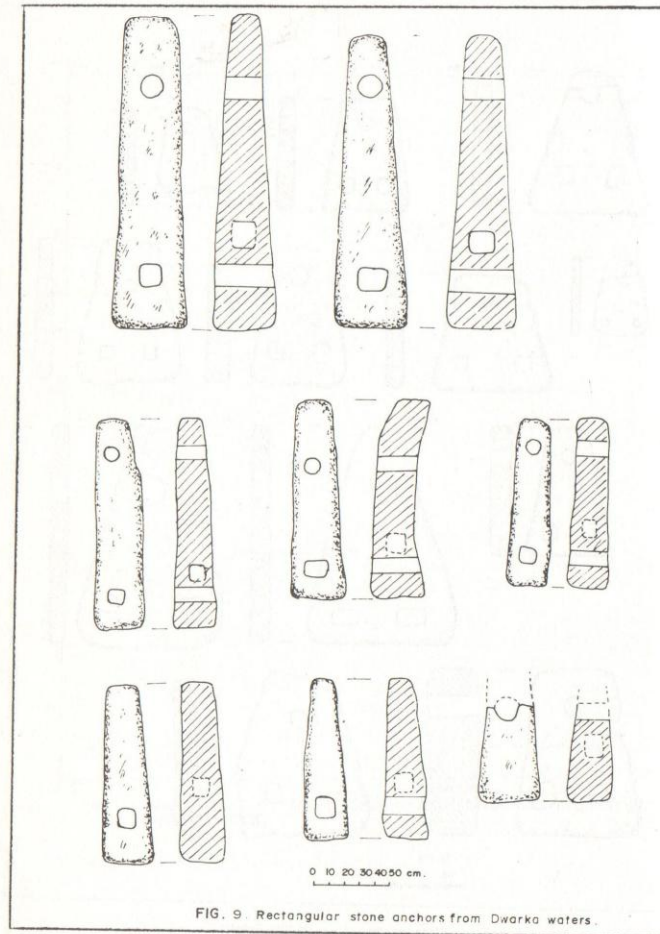


FIG. 8 Triangular Stone Anchors from Dwarka Waters.



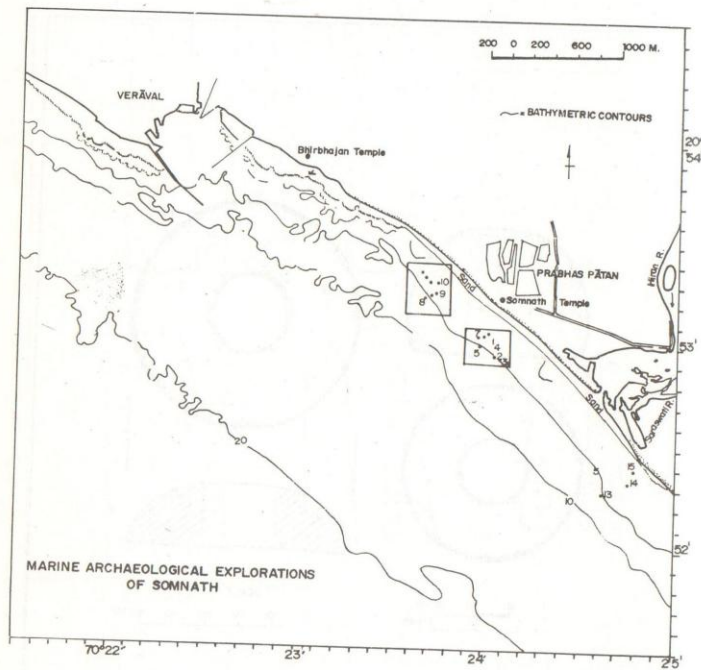


FIG. 11. Map showing the location of Underwater Exploration of Somnath waters.

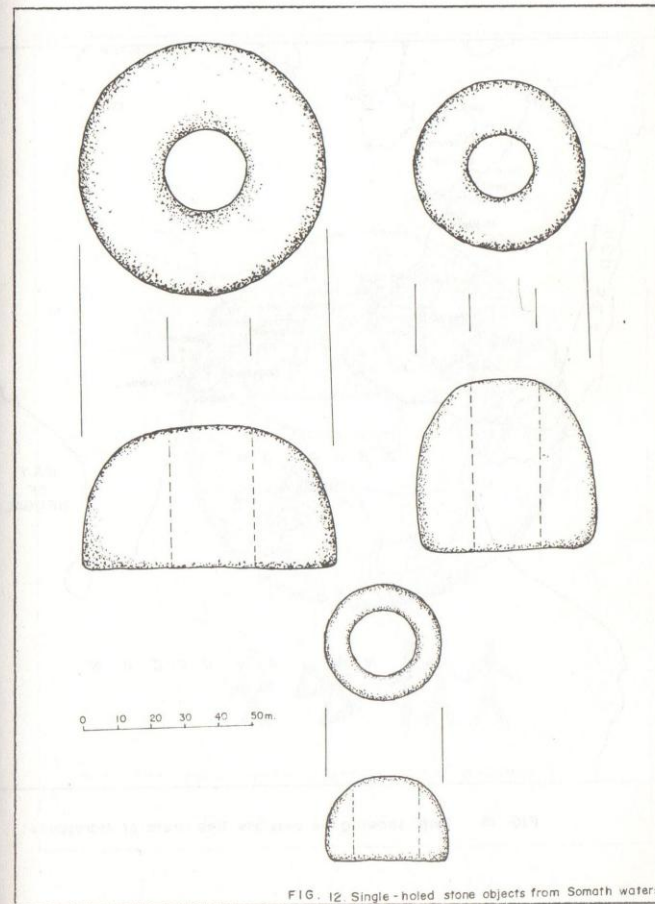
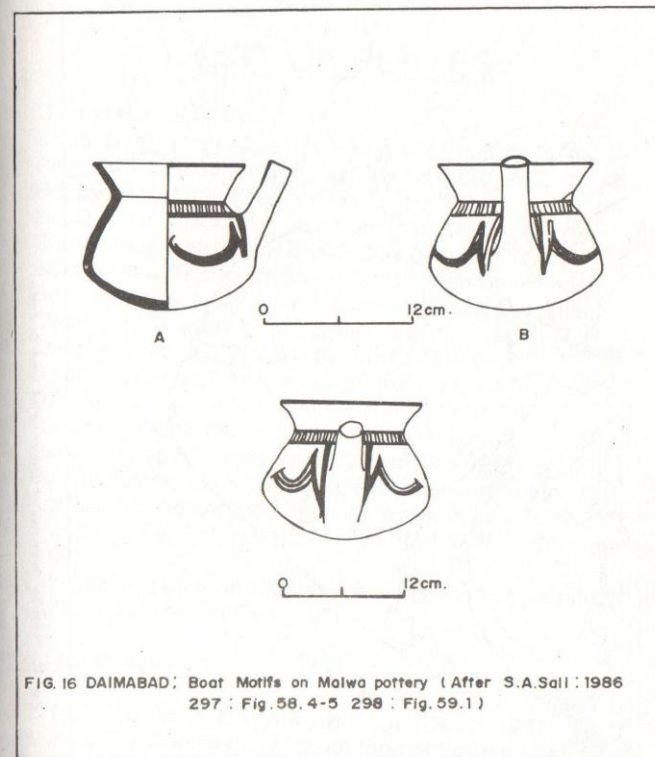
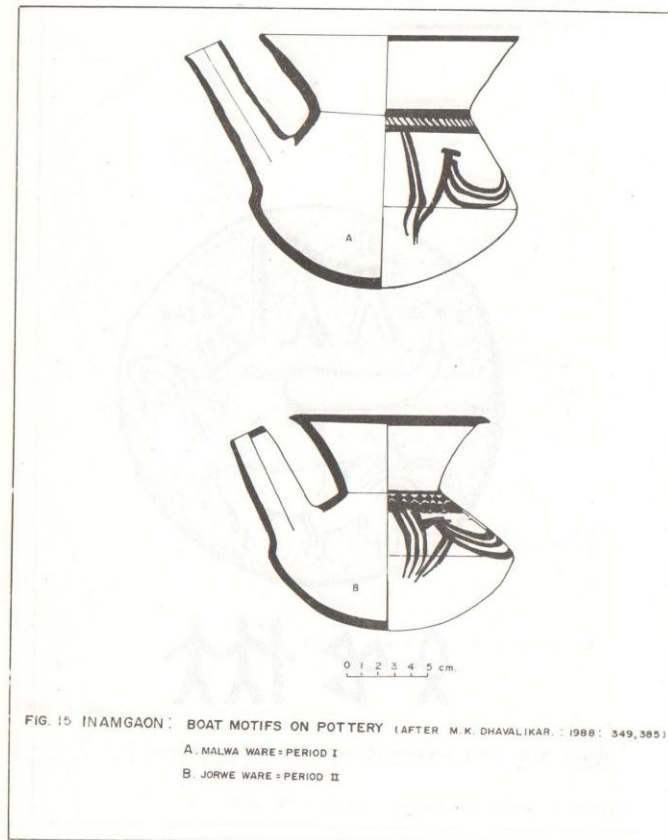


FIG. 12. Single-holed stone objects from Somnath waters.



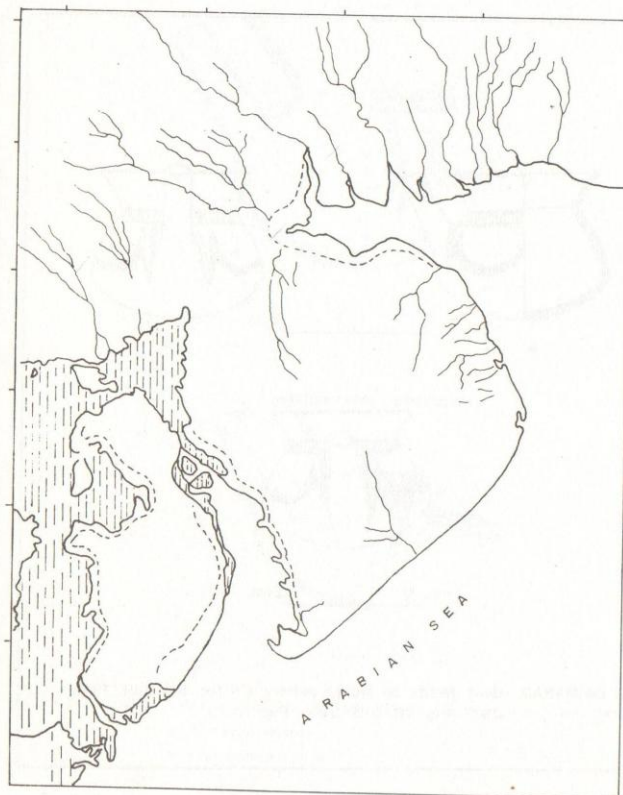


Fig. 17 Proposed Shorelines of Gujarat during Indus Civilization.

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Credit for Plates

- Pl. 1 : After, *NRSA Newsletter*, March, 1991
 Pl. 2 & 3 : Courtesy: *Archaeological Survey of India*
 Pl. 4 to 16 : Courtesy: *Marine Archaeology Centre of NIO, Goa.*
 Pl. 17 : After, *Dr. R.N. Bhattacharya*, 1991.
 Pl. 18 : After *S.J. Heras*, 1953.



PLATE 1

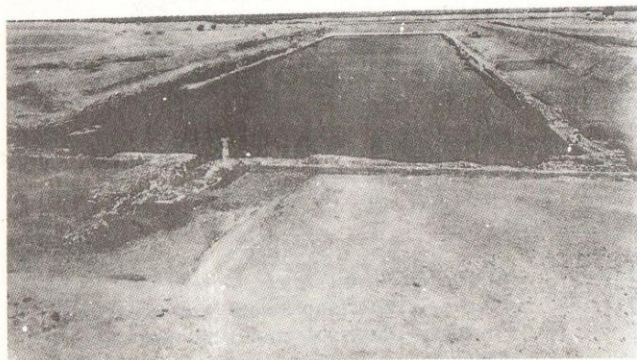


PLATE 2

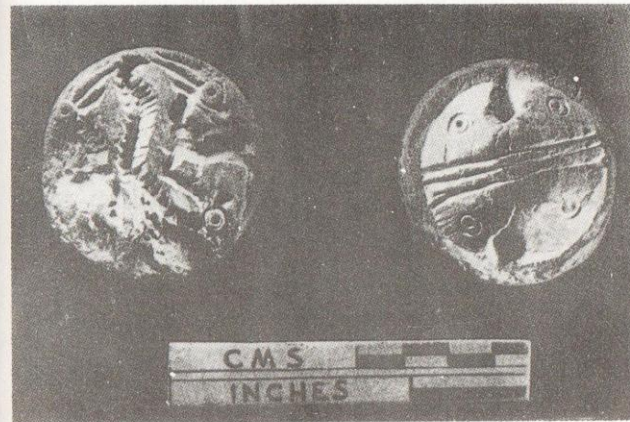


PLATE 3



PLATE 4

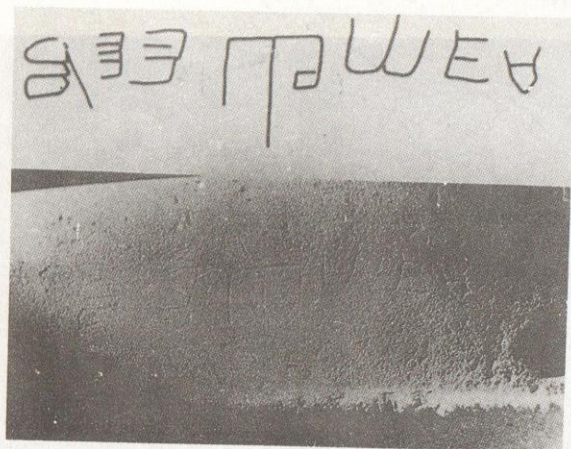


PLATE 5



PLATE 6



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PLATE 9



PLATE 10



PLATE 11



PLATE 12



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PLATE 14



PLATE 15



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PLATE 17



PLATE 18

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APPENDIX

LIST OF HARAPPAN SITES IN GUJARAT

Sr.	Site	Taluka/locality	District	Period	Reference
001.	Adata	Gadhada	Bhavnagar	LH	Lothal, p. 700
002.	Adkot	Jasdan	Rajkot	-do-	IAR-1957-58
003.	Adkot Bus Stand	-do-	-do-	-do-	F.I.C.
004.	Ahmedabad	City	Ahmedabad	H	IAR-1973-74
005.	Ajmer	Morvi	Rajkot	LH	IAR-1957-58
006.	Akata	Kalol	Mehsana	H	IAR-1982-83
007.	Akru	Dhandhuka	Ahmedabad	LH	Lothal
008.	Akvada	Bhavnagar	Bhavnagar	H	IAR-1982-83
009.	Alau	Dhandhuka	Ahmedabad	LH	Lothal
010.	Ali Bada	Jamnagar	Jamnagar	-do-	-do-
011.	Ambaradi	Jasdan	Rajkot	Proto H.	IAR-1978-79
012.	Ambliala	-	Jamnagar	H	-do-
013.	Amra	Jamnagar	-do-	-do-	IAR-1955-56
014.	Anatarnes	Varahi	Banaskantha	-do-	IAR-1978-79
015.	Arlee	Kolvad	Jamnagar	-do-	IAR-1980-81
016.	Ardoi	Kotdasangani	Rajkot	LH	Lothal

Sr.	Site	Taluka/locality	District	Period	Reference
017.	Babarkot	Sayala	Surendranagar	-do-	-do-
018.	Bagsara	Morvi	Rajkot	H	
019.	Balera	Sami	Mehsana	H	IAR-1982-83
020.	Benap	Vav	Banas Kantha	-do-	IAR-1966-67
021.	Belora	Dhoraji	Rajkot	LH	IAR-1957-58
022.	Bed	-	Jamnagar	-do-	Lothal
023.	Bet Dwarka	Okhamandal	-do-	-do-	-do-
024.	Bhagatray	Hansot	Bhroach	H	IAR-1966-67
025.	Bhalgam	Gondal	Rajkot	LH	Lothal
026.	Bhamakdal	Kunkava wadia	Amreli	-do-	IAR-1957-58
027.	Bhangor	Bhanwar	Jamnagar	-do-	Lothal
028.	Bhatiwadi		Rajkot	-do-	IAR-1957-58
029.	Bhayakhakhaia	-	Jamnagar	H	-do-
030.	Bhimnath	-	Ahmedabad	LH	Lothal
031.	Bhimpatal	-	-do-	-do-	-do-
032.	Bhojavadar	-	Bhavnagar	-do-	-do-
033.	Bhokhalidhar	-	-do-	-do-	-do-
034.	Bhut Kotada	Gondal	Rajkot	-do-	-do-
035.	Bhimnagar	Jodiya	Jamnagar	-do-	-do-

Sr.	Site	Taluka/locality	District	Period	Reference
036.	Bodiya	Babra	Amreli	H	IAR-1980-81
037.	Bokhalidhar	Gadhada	Bhavnagar	-do-	IAR-1977-78
038.	Bolera	-	Mehsana	H	IAR-1991-92
039.	Boriya	Jamjodhapur	Jamnagar	H	IAR-1980-81
040.	Budhel	Bhavnagar	Bhavnagar	LH	Lothal,
041.	Chachana	Limbdi	Surendranagar	-do-	L.I.
042.	Chanderwara	-	Jamnagar	-do-	Lothal
043.	Changda	Matar	Khera	H	IAR-1972-73
044.	Chaniyathar	Radhanpur	Banaskantha	LH	IAR-1991-92
045.	Charanio	Samadhiyala	Bhavnagar	LH	IAR-1960-61
046.	Chashiana	-	Surendranagar	H	F.I.C.
047.	Chawanesvar	Bhroach	Bhroach	-do-	IAR-1967-68
048.	Chhabasar	Dholka	Ahmedabad	-do-	IAR-1976-77
049.	Cheolo Bund	-	Bhavnagar	-do-	Lothal
050.	Chitrol	Rapar	Kachchh	H	IAR-1977-78
051.	Chosala	Gadhada	Bhavnagar	-do-	IAR-1971-72
052.	Chota Isvaria	-	-do-	LH	Lothal
053.	Chotaria	Timbo	Mehsana	H	IAR-1990-91
054.	Dad	-	Rajkot	H	IAR-1957-58

Sr.	Site	Taluka/locality	District	Period	Reference
055.	Dadava (Ramdal)	-	Amreli	-do-	IAR-1983-84
056.	Dadka (Godha)	Sami	Mehsana	LH	IAR-1991-92
057.	Daidungri	Jasdan	Rajkot	LH	Lothal
058.	Dantisana	-	Mehsana	-do-	-do-
059.	Desalpur	Nakhtrana	Kachchh	H	Lothal
060.	Devdhar	Jasdan	Rajkot	-do-	IAR-1957-58
061.	Devagam	Nadiad	Khera	-do-	IAR-1973-74
062.	Devagana	Dhandhuka	Ahmedabad	-do-	IAR-1966-67
063.	Devalio	Baravada	Amreli	-do-	IAR-1960-61
064.	Devalio	-	Surendranagar	LH	F.I.C.
065.	Devganga	-	Ahmedabad	LH	Lothal
066.	Dhankani	-	Rajkot	H	IAR-1957-58
067.	Dhankanio 2	Kunkavavvadia	Amreli	-do-	IAR-1958-59
068.	Dhanoria	-	Mehsana	LH	Lothal
069.	Dhatva	Kamraj	Surat	-do-	Mehta, 1975
070.	Dholavira	Rapar	Kachchh	H	-do-
071.	Dhrosan	Kodinar	Amreli	H	IAR-1957-58
072.	Dhrufania	Padadhari	Rajkot	Post H.	IAR-1982-83
073.	Dhupanio	Timana	-do-	-do-	IAR-1960-61

Sr.	Site	Taluka/locality	District	Period	Reference
074.	Dhulkot	Una	Junagadh	-do-	L.I.
075.	Dhulkot	-	Jamnagar	LH	Lothal
076.	Dhutarpur	-	Rajkot	H	IAR-1958-59
077.	Dudkha	Sami	Mehsana	-do-	IAR-1978-79
078.	Dumiani	-	Rajkot	-do-	IAR-1958-59
079.	Dungarpur	Jasdan	-do-	-do-	IAR-1957-58
080.	Eravada	Dasada	Surendranagar	LH	IAR-1982-83
081.	Fariyadka	Bhavnagar	Bhavnagar	H	IAR-1980-81
082.	Fathepura	Dasada	Surendranagar	LH	IAR-1984-85
083.	Gachinobor	-	Mehsana	H	IAR-1990-91
084.	Godha	Radhanpur	Banaskantha	LH	IAR-1991-92
085.	Godha	Sami	-do-	LH	IAR-1991-92
086.	Gadhada	Gadhada	Bhavnagar	-do-	IAR-1971-72
087.	Gadhada	-	Rajkot	-do-	IAR-1960-61
088.	Ghadwali Wadi	-	Kachchh	LH	Lothal
089.	Gheolo Bund	-	Bhavnagar	H	F.I.C.
090.	Ghodhapadar	Rajkot	Rajkot	LH	-do-
091.	Ghorwada	Gondal	-do-	-do-	-do-
092.	Godhad 1	-	Rajkot	H	IAR-1960-61

Sr.	Site	Taluka/locality	District	Period	Reference
093.	Godhad 2	-	-do-	-do-	-do-
094.	Godhad 3	-	-do-	-do-	-do-
095.	Godhana(Timbo I)	Sami,	Mehsana	LH	IAR-1991-92
096.	Godhana(Timbo II)	-do-	-do-	LH	-do-
097.	Gokhijadi Timbo	-	-do-	H	IAR-1990-91
098.	Goni Timbo	-	Surendranagar	H	F.I.C.
099.	Gop	Jamjodhpur	Jamnagar	-do-	-do-
100.	Gunthali	-	Kachchh	-do-	-do-
101.	Hadmatata	Dhankhuka	Ahmedabad	H	IAR-1978-79
102.	Hajnali	Morvi	Rajkot	-do-	IAR-1977-78
103.	Halidhar	Lakhanka	-do-	LH	IAR-1966-67
104.	Halivalo	Gadhada	Bhavnagar	-do-	Lothal
105.	HanumanTimbo	Gadhada	-do-	H	IAR-1971-72
106.	Hariana	Jodiya	Jamnagar	-do-	-do-
107.	Hasanpur	Olpad	Surat	Post H.	IAR-1957-58
108.	Hasanur	Hansot	Baroach	LH	Lothal
109.	Hathab	Bhavnagar	Bhavnagar	H	IAR-1980-81
110.	Ishvariya	Gadhada	-do-	-do-	IAR-1971-72
111.	Itariy	-	-do-	-do-	Lothal

Sr.	Site	Taluka/locality	District	Period	Reference
112.	Jaidak	Jodiya	Jamnagar	-do-	-do-
113.	Jatavadar	-	Kachchh	-do-	F.I.C.
114.	Jhangar	Anjar	Kachchh	H	IAR-1965-66
115.	Jhekhada	Varahi	Banas Kantha	-do-	IAR-1971-72
116.	Jhikri	-	Rajkot	LH	Lothal
117.	Jivani	Vangadhara	Bhavnagar	H	IAR-1960-61
118.	Jivani-no-Dhora	Umrata	-do-	LH	Lothal
119.	Jobala-Ner -Notimbo	Dhandhuka	Ahmedabad	H	IAR-1966-67
120.	Jodhpur	-	Rajkot	LH	IAR-1957-58
121.	June Timbi	Lalpur	Jamnagar	H	IAR-1980-81
122.	Kaero Timbo	-	Surendranagar	-do-	F.I.C.
123.	Kaj	Kodinar	Amreli	-do-	IAR-1957-58
124.	Kalapan	Kandorna	Rajkot	-do-	IAR-1957-58
125.	Kalianpur	Kalianpur	Jamnagar	LH	Lothal
126.	Kalvad I	Kalvad	-do-	H	IAR-1980-81
127.	Kalvad II	-do-	-do-	-do-	-do-
128.	Kalvad III	-do-	-do-	-do-	-do-
129.	Kanasutaria	Dholka	Ahmedabad	LH	Lothal

Sr.	Site	Taluka/locality	District	Period	Reference
130.	Kaneval	Cambay	Khera	-do-	IAR-1972-73
131.	Kanjatar	Kodinar	Amreli	H	-do-
132.	Kanthkot	-	Kachchh	-do-	F.I.C.
133.	Karmar	Gondal	Rajkot	-do-	IAR-1977-78
134.	Katar	Rapar	Kachchh	LH	
135.	Kerali	Jetpur	-do-	H	IAR-1958-59
136.	Kerasi	Rapar	Kachchh	-do-	IAR-1965-66
137.	Keravalo	Rajpipla	Bhavnagar	LH	IAR-1960-61
138.	Keria	Kalol	Mehsana	H	IAR-1982-83
139.	Kerisma-no-Timbo	-	Khera	LH	Lothal
140.	Khakhara Bela 1	Khakhara Bela	Rajkot	H	IAR-1960-61
141.	Khakhara Bela 2	-do-	-do-	-do-	-do-
142.	Khakhara Bela 3	-do-	-do-	-do-	-do-
143.	Khakhara Dera	Kanthakot	Kachchh	LH	-do-
144.	Khambhodhar	-	Amreli	H	IAR-1957-58
145.	Khanderio-1	Rampara	Bhavnagar	LH	IAR-1960-61
146.	Khanderio-2	Rampara	Bhavnagar	LH	F.I.C.

Sr.	Site	Taluka/locality	District	Period	Reference
147.	Khandia	-	Mehsana	-do-	Lothal
148.	Khankhara Bela-1	-	Rajkot	H	F.I.C.
149.	Khankhara Bela-2	-	-do-	-do-	-do-
150.	Khanpur	-	Surendranagar	-do-	F.I.C.
151.	Kharedo-no-Timbo	-	Rajkot	LH	-do-
152.	Khari-ka-Khanda	Bhachau	Kachchh	-do-	IAR-1965-66
153.	Khavda	Bhuj	Kachchh	-do-	IAR-1977-78
154.	Khedoi	Anjar	-do-	-do-	IAR-1976-77
155.	Khetarvalo	Alatala	Bhavnagar	-do-	IAR-1960-61
156.	Kindar Khera	-	Jamnagar	LH	F.I.C.
157.	Khirasar	-	Kachchh	H	
158.	Khodiyar	Talaja	Bhavnagar	LH	IAR-1957-58
159.	Koha	-	Rajkot	H	IAR-1957-58
160.	Kola	Khambhaliya	Jamnagar	-do-	IAR-1980-81
161.	Kotada	Anjar	-do-	-do-	-do-
162.	Kotada	-	Jamnagar	LH	Lothal
163.	Kotada Bhadi-1	Nakhtrana	Kachchh	-do-	IAR-1965-66

Sr.	Site	Taluka/locality	District	Period	Reference
164.	Kotada Bhadi-2	Nakhtrana	Kachchh	-do-	F.I.C.
165.	Kotadi	Rapar	Kachchh	H	IAR-1967-66
166.	Kotara	Khavda	-do-	-do-	IAR-1967-68
167.	Kotasar	-	Kachchh	LH	Lothal
168.	Kotda	Kalavad	Jamnagar	-do-	IAR-1957-58
169.	Koth	Dholka	Ahmedabad	-do-	IAR-1982-83
170.	Kothara	Abdas	-do-	H	IAR-1977-78
171.	Kundanpur	Jasdan	Rajkot	-do-	IAR-1957-58
172.	Kutharivad	Kalvad	Jamnagar	-do-	IAR-1980-81
173.	Kuwar	-	Mehsana	-do-	F.I.C.
174.	Kuwarad	Sami	Mehsana	-do-	IAR-1978-79
175.	Lakhabaval	Jamnagar	Jamnagar	-do-	IAR-1955-56
176.	Lakhanka	Gadhada	Bhavnagar	H	IAR-1971-72
177.	Lakhan Timbo	-	Jamnagar	-do-	F.I.C.
178.	Lakhapar	Rapar	Kachchh	-do-	IAR-1965-66
179.	Lakhavav	Junavadar	Bhavnagar	LH	IAR-1960-61
180.	Lakhpat	-	Kachchh	-do-	-do-
181.	Laloi-no-Timbo	Kulwad	Jamnagar	H	IAR-1971-72

Sr.	Site	Taluka/locality	District	Period	Reference
182.	Lorala	Sami	Mehsana	-do-	IAR-1978-79
183.	Lothal*	Dholka	Ahmedabad	-do-	Lothal
184.	Lukhela	-	Rajkot	-do-	IAR-1958-59
185.	Luna	Nakhatrana	Kachchh	-do-	
186.	Luna	Mandavi	Mandavi	-do-	LH
187.	Machiala Mota	Amreli	Amreli	LH	Lothal
188.	Madan Kundala Gondal	-	Rajkot	H	IAR-1983-84
189.	Madeva	-	Amreli	LH	F.I.C.
190.	Madhi	-	-do-	-do-	-do-
191.	Mahadevayo	Darel	Bhavnagar	LH	IAR-1960-61
192.	Mahadevio	-	Amreli	-do-	Lothal
193.	Mahakal-no-Timbo	Dholka	Ahmedabad	H	IAR-1976-77
194.	Mahudi	-	Mehsana	LH	Lothal
195.	Makwana Timbo	Godhada	Bhavnagar	LH	IAR-1984-85
196.	Malgam	-	Rajkot	-do-	F.I.C.
197.	Malgodh	-	Rajkot	H	IAR-1957-58
198.	Malvan	Chaurari	Surat	LH	IAR-1973-74

Sr.	Site	Taluka/locality	District	Period	Reference
199.	Manar	-	Bhroach	LH	Lothal
200.	Manverpura	Sami	Mehsana	H	IAR-1982-83
201.	Medeva	Babra	Amreli	LH	Lothal
202.	Mehgam	Bhroach	Bhroach	-do-	IAR-1957-58
203.	Meghper	Bhuj	Kachchh	H	IAR-1980-81
204.	Metal	Dholka	Ahmedabad	-do-	IAR-1976-77
205.	Mora	Jamnagar	Jamnagar	LH	Lothal
206.	Morpur	Khambhalia	-do-	-do-	-do-
207.	Moruo	Rapar	Kachchh	H	IAR-1967-68
208.	Mulpadar	-	Jamnagar	-do-	IAR-1957-58
209.	Mungatoda	Lalpur	-do-	-do-	IAR-1980-81
210.	Nageswar	Okha	Jamnagar	LH	IAR-1983-84
211.	Nagwada	Dasada	Surendranagar	-do-	IAR-1984-85
212.	Naj	Daskroi	Ahmedabad	-do-	IAR-1973-74
213.	Nana-Ishvariya	Gadhada	Bhavnagar	-do-	IAR-1971-72
214.	Nani Chandur	Sami	Mehsana	H	IAR-1991-92
215.	Narapa	Nakhatrana	Kachchh	H	IAR-1967-68
216.	Narmana	Jamjodhpur	Jamnagar	-do-	-do-
217.	Nasitpur	Valabhipur	-do-	-do-	IAR-1980-81

Sr.	Site	Taluka/locality	District	Period	Reference
218.	Navagam	-	Surat	LH	Lothal
219.	Navinal	Mandavi	Kachchh	-do-	
220.	Nenu-ni-Dhar	Khavda	Kachchh	H	IAR-1967-68
221.	Ner	Bhachau	-do-	-do-	IAR-1980-81
222.	Neshdo	-	Amreli	LH	Lothal
223.	Netra-Khirasara	Nakhatrana	-do-	-do-	IAR-1967-68
224.	Noyka (Footaria)	Sami	Mehsana	H	IAR-1991-92
225.	Odhera Timbo		-do-	-do-	IAR-1990-91
226.	Old Alatala	Alatala	Bhavnagar	H	IAR-1960-61
227.	Old Peer	Lalpur	Jamnagar	-do-	IAR-1980-81
228.	Oriyao	Gadhada	Bhavnagar	H	IAR-1971-72
229.	Oriyo Timbo Chiroda	Gadhada	Bhavnagar	LH	IAR-1984-85
230.	Orumana		Mehsana	H	IAR-1990-91
231.	Pabumath	Rapar	Kachchh	-do-	IAR-1965-66
232.	Padadhari	Padadhari	-do-	Proto H.	IAR-1978-79
233.	Padar	-	Rajkot	LH	Lothal
234.	Padri	Talaja	Bhavnagar	H	
235.	Pahadia	Mahemadavad	Khera	H	IAR-1973-74

Sr.	Site	Taluka/locality	District	Period	Reference
236.	Pal	Gondal	Rajkot	LH	Lothal
237.	Pancha pipro	Lalpur	Jamnagar	H	IAR-1980-81
238.	Panchasar	Hariji	Mehsana	LH	Lothal
239.	Pansina	-	Surendranagar	-do-	F.I.C.
240.	Pasegam	Rajpipla	Bhavnagar	-do-	IAR-1960-61
241.	Patan	Valabhipur	-do-	H	IAR-1980-81
242.	Pavteswar	-	Ahmedabad	LH	F.I.C.
243.	Peer-ni-darga	Kalvad	Jamnagar	-do-	-do-
244.	Peervala	Lalpur	-do-	-do-	-do-
245.	Phala	Jamnagar	Jamnagar	LH	Lothal
246.	Phul-Timbo	Gadhada	Bhavnagar	-do-	IAR-1971-72
247.	Phulvadi	-do-	-do-	-do-	-do-
248.	Pipalia	Jasadan	Rajkot	H	IAR-1980-81
249.	Piplage	Amreli	Amreli	Proto H.	IAR-1978-79
250.	Pirojpur	Sami	Mehsana	H	-do-
251.	Pirwada-Khetar	Anjar	Kachchh	-do-	IAR-1965-66
252.	Pitar	Jodiya	Jamnagar	LH	Lothal
253.	Pitaria	Jetpur	Rajkot	-do-	-do-
254.	Pitnad	-	-do-	LH	Lothal

Sr.	Site	Taluka/locality	District	Period	Reference
255.	Pithadia	-	-do-	H	IAR-1957-58
256.	Prabhasa Patan	Veraval	Junagadh	-do-	IAR-1975-76
257.	Rajathali	-	Rajkot	H	IAR-1957-58
258.	Rajpipla-1	Gadhada	Bhavnagar	-do-	IAR-1971-72
259.	Rajpipla-2	-do-	-do-	LH	F.I.C.
260.	Rajpipla-3	-do-	-do-	-do-	-do-
261.	Rajpipla-4	-do-	-do-	-do-	-do-
262.	Rajpipla-5	-do-	-do-	-do-	-do-
263.	Rajpipla-6	-do-	-do-	-do-	-do-
264.	Rajpipla-7	-do-	-do-	-do-	-do-
265.	Rajpipla-8	-do-	-do-	-do-	-do-
266.	Rajpipla-9	-do-	-do-	-do-	-do-
267.	Rajwadio Timbo II	-	Mehsana	H	IAR-1990-91
268.	Rampara-1	-	Bhavnagar	LH	Lothal, 701
269.	Rampara-2	-	-do-	-do-	F.I.C.
270.	Rampara	-	Kachchh	-do-	-do-
271.	Ramvav	Rapar	-do-	H	IAR-1977-78
272.	Randaliyo	Kalianpur	Amreli	-do-	IAR-1958-59

Sr.	Site	Taluka/locality	District	Period	Reference
273.	Rangpur	Limbdi	Surendranagar	-do-	IAR-1953-54
274.	Ranigam	Darel	Bhavnagar	LH	IAR-1960-61
275.	Raniono Timbo	Gadhada	-do-	-do-	IAR-1984-85
276.	Ranparda	Lalpur	Jamnagar	H	IAR-1957-58
277.	Ranpur	-do-	-do-	LH	IAR-1980-81
278.	Rastamgadh	Dasada	Surendranagr	-do-	IAR-1984-85
279.	Ratanpur	Sami	Mehsana	-do-	-do-
280.	Rayadi	Jam-Kandorana	Rajkot	Proto H.	IAR-1978-79
281.	Rojdi	Gondal	Rajkot	H	IAR-1962-63
282.	Sai-Devli	-	Jamnagar	-do-	IAR-1978-79
283.	Sai-no-Tikra	-	Khera	LH	Lothal
284.	Saladi	Kalol	Mehsana	-do-	IAR-1982-83
285.	Samadhiyala	Gadhada	Bhavnagar	H	IAR-1971-72
286.	Samagogha	-	Kachchh	-do-	Lothal
287.	Sapar wadi	Kalwad	Jamnagar	-do-	IAR-1980-81
288.	Savani	Veraval	Junagadh	H	IAR-1958-59
289.	Seed Farm	-	Bhavnagar	LH	Lothal
290.	Selari	Rapar	Kachchh	-do-	IAR-1967-68

Sr. Site	Taluka/locality	District	Period	Reference
291. Senalo	-	Jamnagar	-do-	Lothal
292. Serval	Hariji	Mehsana	LH	IAR-1982-83
293. Shakatri Timbo	Radhanpur	Banaskantha	H	IAR-1991-90
294. Shibpur	Sami	Mehsana	H	IAR-1978-79
295. Shikarpur	-	Kachchh	LH	
296. Shrinagar	-	Jamnagar	LH	F.I.C.
297. Sidsar	Bhavnagar	Bhavnagar	H	IAR-1980-81
298. Sonur	Sami	Mehsana	H	IAR-1982-83
299. Sujnipur	-	-do-	LH	Lothal
300. Sultanpur	Kuntavavvadia	Amreli	-do-	-do-
301. Surkotda	Rapar	Kachchh	H	IAR-1964-65
302. Sushiya	-	Mehsana	LH	Lothal
303. Talvadi no-Timbo	Dhandhuka	Ahmedabad	H	IAR-1966-67
304. Talwadi	Lalpur	Jamnagar	-do-	IAR-1980-81
305. Tankaria	-	-do-	LH	Lothal
306. Taraghada-		Rajkot	H	IAR-1957-58
307. Tarana	Tarana	Jamnagar	LH	IAR-1960-61
308. Tarasamra	Bhavnagar	Bhavnagar	H	IAR-1980-81

Sr. Site	Taluka/locality	District	Period	Reference
309. Tatana	Gadhada	-do-	-do-	IAR-1971-72
310. Telod	Hansot	Bhroach	LH	IAR-1966-67
312. Tetario	-	Amreli	-do-	Lothal
313. Tetario	-	Rajkot	H	IAR-1958-59
314. Thebachada-		-do -	LH	F.I.C.
315. Timbo	Kalvad	Jamnagar	H	IAR-1980-81
316. Thunda Timbo	Radhanpur	Banaskantha	LH	IAR-1991-92
317. Thumda I (near Lakhneyani)	Sami	Mehsana	LH	IAR-1991-92
318. Timaram	-	Rajkot	-do-	IAR-1957-58
319. Timbi I	Lalpur	Jamnagar	-do-	IAR-1980-81
320. Timbo	Kalvad	-do-	-do-	-do-
321. Todio	Lakhapat	Kachchh	-do-	Lothal
322. Vachali Ghodi	Padadhari	Rajkot	Prot.H.	IAR-1978-79
323. Vada	Nakhatrana	Kachchh	LH	IAR-1967-68
324. Vadagam	Dasada	Surendranagar	H	IAR-1964-65
325. Vadgam	Cambay	Khera	-do-	IAR-1972-73
326. Vadasada	-	Rajkot	-do-	IAR-1958-59
327. Vadera	Amreli	Amreli	-do-	IAR-1978-79

Sr.	Site	Taluka/locality	District	Period	Reference
328.	Vaghania Juna	Kunkavavvadia	-do-	Proto H.	-do-
329.	Vaghel	Sami	Mehsana	H	IAR-1982-83
330.	Vaharvo	Vangadhara	Bhavnagar	LH	IAR-1960-61
331.	Valotri	Matar	Khera	H	IAR-1972-73
332.	Valpura	-	Bhavnagar	LH	Lothal
333.	Vanivadar	-	Amreli	LH	-do-
334.	Vankiner	-	Jamnagar	H	IAR-1957-58
335.	Varudimatano Timbo	Dholka	Ahmedabad	-do-	IAR-1976-77
336.	Vegadi	-	Rajkot	-do-	IAR-1958-59
337.	Venkiner	-	-do-	LH	Lothal
338.	Virpur	-	-do-	-do-	-do-
339.	Visnagar (Lakhetro no Timbo)	Dasada	Surendranagar	LH	IAR-1991-92
340.	Visnagar (Lindoriwalo Khetar)	-do-	-do-	LH	-do-
341.	Wasai	-	Jamnagar	-do-	-do-
342.	Zekhada	Santalpur	Banaskantha	-do-	IAR-1977-78

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